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MALIGNANT DISEASE OF THE NOSE, PARANASAL SINUSES AND POST-NASAL SPACE IN EAST AFRICA*

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MALIGNANT disease of the nose, paranasal sinuses and post-nasal space presents a different and more difficult problem in East Africa, than in Europe or America.

The relative incidence of malignant disease in these areas is higher, the type of case is different, and a more advanced stage of the disease is present amongst hospital patients than is usually seen in more developed countries.

Radiotherapy is not available in East Africa, and a different approach is necessary in the management of these patients from that usually followed.

Three types of cases will be discussed as they occur in the natives of Kenya.

i. Round cell sarcoma, presenting as Hutchison's Syndrome in children . . . . 40 cases.
ii. Malignant disease of the post-nasal space in adolescents and adults . . . . . 61 cases.
iii. Malignant growths of the nose and anterior group of nasal sinuses in adults . . . . . 56 cases.

* From a lecture delivered at the Institute of Laryngology and Otology, London, on August 24th, 1960.

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Incidence: Cases admitted to the King George VI Hospital, Nairobi, are referred from district and provincial hospitals throughout Kenya and are representative of the native population as a whole. Hospital statistics can be misleading as cases are subject to varying degrees of selection and the figures quoted cannot be taken as absolute for the incidence of malignancy in Kenya. With this proviso the incidence of malignant cases admitted to the King George VI Hospital are of interest when compared with the admission figures of some hospitals in Europe.

In the five year period 1954–1958, 644 patients suffering from malignant disease were admitted to the King George VI Hospital. 208 (or 32·3%) of these suffered from a malignancy of the head and neck area. In 56 (or 8·7%), the nose or anterior group of sinuses was the primary site of the disease and in 61 (or 9·5%) the disease originated in the post-nasal space. These figures contrast strongly with those reported from Europe, though are similar to those published by Shapiro *et al.* (1955) relating to the Bantu population of the Transvaal. Williams (1950) has quoted an annual admission of 2–4 cases of carcinoma of the antrum out of a total of 2,000 admissions for malignant disease to St. Bartholomew's Hospital, London. Wille (1947) found that only 1·62% of the cancer patients admitted to the Norwegian Radium Hospital suffered from disease in this area. Clemmensen (1951) found that malignant disease of the nose and accessory sinuses formed only 0·3% of all malignancies in Denmark. The American figures as reported by May (1951) and Heatley (1953) show little difference from those in Europe.

Vint (1935), Shapiro (1955) and Knowelden (1957) have commented on the differences between European and African malignancy figures and Table I shows that these differences also exist in Kenya.

Whereas in Europe the major incidence of carcinoma occurs in the abdomen, with a progressive decrease towards the mouth and pharynx, the exact opposite applies in East Africa. Shapiro *et al.* (1955) in a comparative study of European and Bantu malignant cases in the Transvaal noted the high incidence of cancer of the maxillary antrum and the rarity of lung cancer in the Bantu, whilst in the European the incidence of lung cancer was relatively high and tumours of the sinuses comparatively rare. He concluded that malignant disease of the paranasal sinuses is ten to twenty times greater in the Bantu than in the European.

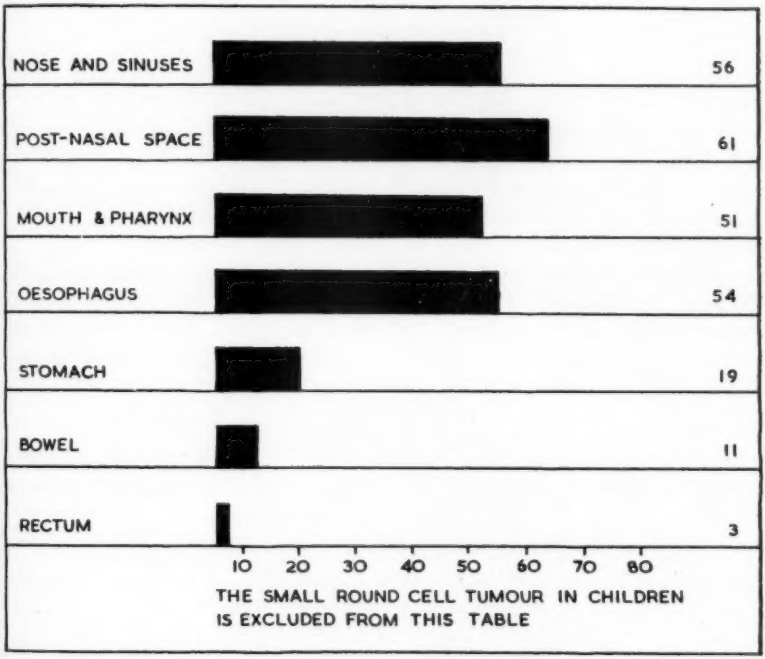
Possible Ætiological Factors

(*a*) The native population of Kenya has a low standard of living, as yet touched only lightly by civilization. They live in huts in which little allowance is made for ventilation. Certain fumes are known to be carcinogenic and the prolonged and constant inhalation of cooking fumes and fire smoke may be significant in the African.

(*b*) Chronic suppurative and vasomotor rhinitis are common amongst the African and severe atrophic rhinitis is frequently seen. Ringertz (1938), Capps (1950) and Winborn (1955) considered that the change from a columnar to a squamous type epithelium, due to an irritative metaplasia might be ætiologically significant.

TABLE I.

HISTOGRAM SHOWING THE INCIDENCE OF MALIGNANT DISEASE IN DIFFERENT AREAS ADMITTED TO KING GEORGE VI 1954–58. THE SMALL ROUND CELL TUMOUR IN CHILDREN IS EXCLUDED FROM THIS TABLE.



(*c*) Shapiro has suggested that the comparative incidence of antral and pulmonary carcinomas in the European and the Bantu can be accounted for by their different tobacco habits. The inhalation of snuff is a common habit in middle-aged and elderly Africans of both sexes, whereas cigarette consumption is unusual. This however does not account for the high incidence of post-nasal space malignancy in adolescents.

(*d*) Lambert (1960) commenting on the high incidence of cancer of the post-nasal space both in Chinese residents in Canton Province, and those resident in a different environment in America for more than one generation, considers that an inherited racial predisposition may be important.

A hereditary factor might account for the high incidence of round cell sarcoma in African children in different parts of the continent.

(*e*) A virus factor.

Burkitt 1958, describing the round cell tumour syndrome in African children in Uganda, noted that this tumour entity has been described in the Belgian Congo and in the Gambia. Many tribes of Equatorial Africa live cheek by jowl with their livestock and, as Bendixen has shown that lymphatic leukæmia in cattle is due to a virus infection spread by infected milk, sputum, urine or fæces, further research is required on this syndrome, which may be due to a virus factor, and what part, if any, livestock or arthropod vectors play in the transmission of the disease.

I. Hutchison's Syndrome in African Children

In 1907, Hutchison described a case of retroperitoneal sarcoma with secondaries in the skull, and gave his name to the syndrome. It is now accepted that Hutchison's case referred to a neuroblastoma, though he was unaware of the neural origin. The term is used here to describe a round cell tumour, clinically resembling a neuroblastoma.

This is by far the most common tumour of the head and neck area affecting African children in Kenya, and Burkitt (1958) has described a similar entity in Uganda. Forty such cases have been seen in this Department since 1954, and in 29 of these, one or both maxillae were involved.

Age and Sex:

As will be seen from Table II the majority of these tumours presented between the ages of 3 and 7 years, and boys were more frequently affected than girls.

TABLE II.

SHOWS THE SEX AND AGE INCIDENCE OF HUTCHISON'S SYNDROME IN AFRICAN CHILDREN

Male	–	1	2	5	6	2	5	1	–	2	–	24
Female	2	2	1	2	2	4	1	–	–	–	2	16
Years	1	2	3	4	5	6	7	8	9	10	11	

Clinical Picture:

The tumour presents as a large smooth swelling involving the upper or lower jaw (Figs. 1–5). If the antroethmoidal area is primarily affected, there may be marked proptosis and ulceration of the orbital contents. Pain is usually absent until ulceration occurs, and even then is not constant. The child may have a huge ulcerating tumour involving the orbit or

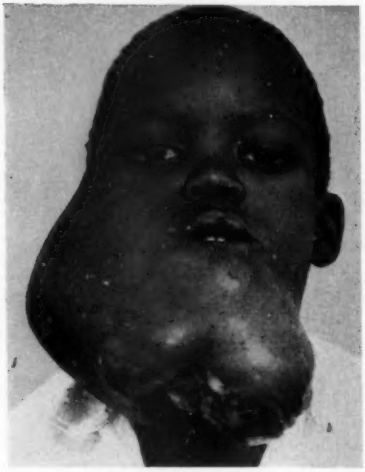


FIG. 1.

Boy aged 5. Hutchison's Syndrome. Large ulcerating tumour involving mainly the right mandible. Post mortem showed involvement of the lungs and kidneys. There was a large upper abdominal retroperitoneal tumour (Fig. 6).

FIG. 2.

Boy aged 3½. Hutchison's Syndrome. Tumour of the upper left maxilla and orbit. A similar, but separate tumour mass involved the angle of the left mandible.

FIG. 3.
Boy aged 7. Hutchison's Syndrome. Tumour of the left upper and lower jaw.

FIG. 4.
Boy aged 4. Hutchison's syndrome. Tumours of both maxillae.

FIG. 5.

Boy aged 3. Hutchison's Syndrome. Tumours of both maxillae. The growth on the left side has grown over the left orbit. On the right side there was considerable disruption of the upper alveolus.

alveolus and appear free from pain. As will be seen from Table III, though the left maxilla was the commonest site, involvement of both maxillae is by no means uncommon, and more than one tumour may present in the face.

TABLE III.

SHOWS THE SITE OF FACIAL TUMOURS IN 40 CHILDREN PRESENTING WITH HUTCHISON'S SYNDROME.

Left maxilla	14
Right maxilla	6
Right and left maxillae	7
Right mandible	4
Left mandible	5
Maxillary and mandibular tumour ..	2
Skull bones	2

When the alveolus is involved, tumour growth causes destruction of bone and loosening of teeth. Egg-shell cracking has not been noted, either with mandibular or maxillary tumours. Lymph gland involvement is most noticeable by its absence, and when evident is associated with ulceration

of the growth. The peripheral blood picture remains within normal limits until the usual response to infection is noted. Routine marrow biopsies are normal.

Deposits other than in the maxillae or mandible.

During life or at post-mortem, deposits may be found in the adrenals, kidneys, liver, thyroid, pancreas, gonads, and in other cranial and long bones.

FIG. 6.

Hutchison's Syndrome. A very typical and common post mortem finding; a large upper abdominal retroperitoneal tumour, surrounding, and in some cases destroying the pancreas. Specimen from case shown in Fig. 1.

Figure 6 illustrates one of the commonest post-mortem findings, a huge retroperitoneal tumour in which it is difficult to differentiate the pancreas and suprarenals from the general tumour mass.

Pathology and Histology:

Macroscopically the tumour appears as a soft white or pink uncapsulated mass, poorly defined from the surrounding bone, which is destroyed as the tumour grows. In the early stages, the tumours are smooth and confined by a thickened periosteum, but later, growth takes place through the periosteum, and the surrounding tissue is invaded. New bone formation may occur about deposits in long bones, producing a typical sun-ray appearance which may lead to a mistaken diagnosis of Ewing's Sarcoma, but this does not occur in the maxilla or mandible. Histologically, the

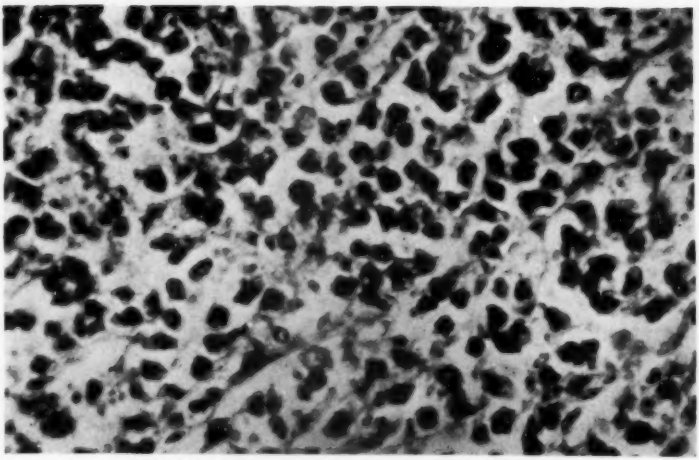


FIG. 7.

Histological section from abdominal tumour shown on Fig. 6 stained with H. and E. The cells are diffusely arranged, fibrils are present which do not react to silver stains.

tumour is composed of small round cells, with little cytoplasm and very darkly staining nuclei. The degree of differentiation varies from a diffuse mass of cells (Fig. 7) to a rather well-marked and typical arrangement which simulates rosette formation (Fig. 8).

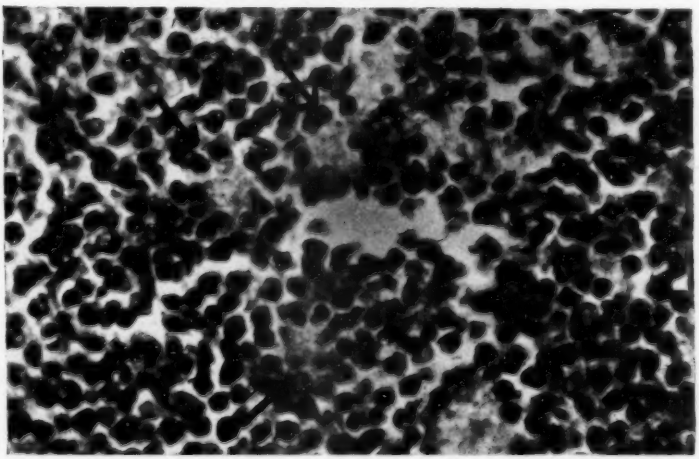


FIG. 8.

Histological section stained with H. and E. from patient shown on Fig. 3. Some areas (marked →) show a cell arrangement which simulates rosette formation.

The diagnosis of this syndrome is based entirely on the clinical characteristics of the tumour entity. The age of the patient, the site of the tumour, the absence of lymph gland involvement until late in the disease, the normal blood and marrow picture, and the other organs involved, all suggest Hutchison's Syndrome. Histologically, the tumour appears as a lymphoma or round cell sarcoma rather than a neuroblastoma, though clinically there is nothing to support such a diagnosis. It is recognized that the term "round cell tumour" is inexact and unsatisfactory, but to label this tumour a lymphoma or a neuroblastoma, would be incorrect at present.

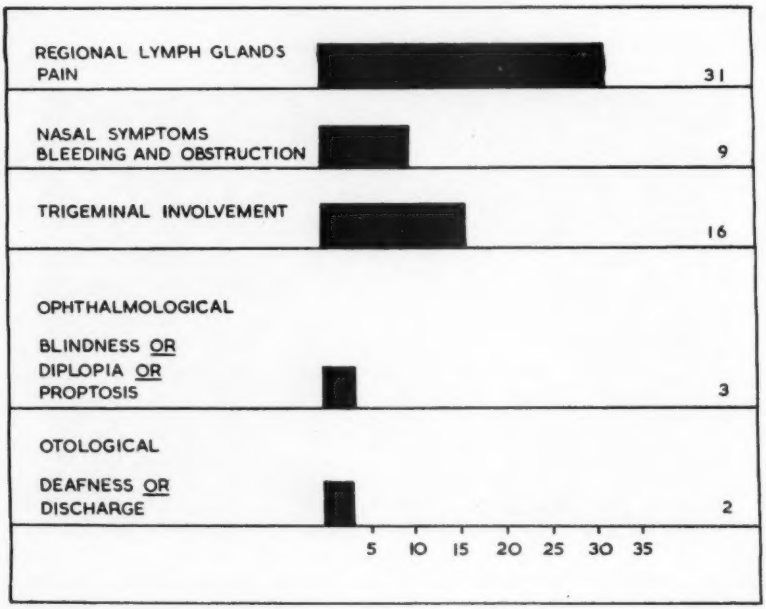
II. Malignant Disease of the Post-Nasal Space in Adolescents and Adults

As will be seen from Table I, this group formed the commonest tumour entity, 61 cases having been admitted to hospital in the period under review. Men and women were equally affected but in the African the condition differs from that seen in Europe, in that:

(*a*) All cases had palpable malignant neck glands when first seen.

TABLE IV.

HISTOGRAM SHOWING THE PRIMARY PRESENTING SYMPTOM IN 61 PATIENTS WITH MALIGNANT GROWTHS OF THE POST-NASAL SPACE.



(*b*) Sarcoma occurred more frequently than carcinoma and the majority of tumours were histologically poorly differentiated.

(*c*) Young people form a large percentage of the patients seen.

Table IV illustrates the primary reason why patients first sought attention. It is obvious that pain, due either to the pressure of secondary gland masses on the cervical or brachial plexuses, or direct trigeminal involvement was the commonest presenting symptom, and these gland masses often attained considerable proportions (Figs. 9 and 10).

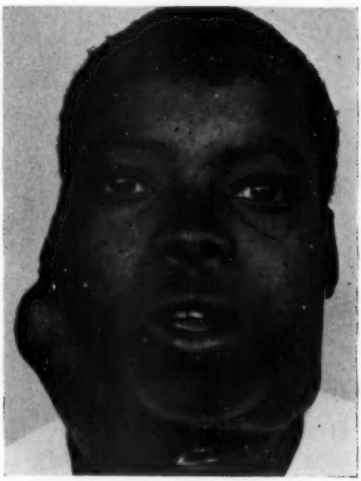


FIG. 9.

Boy aged about 17. Anaplastic carcinoma of the post-nasal space. His main complaint was pain due to right trigeminal involvement. He did not complain about a left 4th and 6th nerve paralysis or of deafness in the right ear.

Patients with nasal conditions such as bleeding and obstruction formed the second largest group. Subsequent examination usually revealed other symptoms and signs associated with a malignant lesion in the post-nasal space, i.e., unilateral deafness, diplopia, blindness in one eye, or defective palatal movement, but as will be seen from Table IV, these were rarely the cause of the patient coming to hospital. All cases when first seen had palpable malignant neck glands.

Pathology: In England, carcinoma occurs more frequently than sarcoma, and squamous epithelioma is the commonest tumour, but the reverse is the case in this series, viz. Table V. No case of squamous epithelioma has been noted, and though anaplastic carcinoma was the commonest tumour seen the total incidence of sarcoma was higher.

TABLE V.

HISTOLOGICAL FINDINGS IN 61 PATIENTS WITH MALIGNANT GROWTHS OF THE POST-NASAL SPACE.

Anaplastic Carcinoma	21	
Undifferentiated	11	
Reticulum Cell Sarcoma	17	29
Lympho-sarcoma	10	
Fibro-sarcoma	2	

FIG. 10.

Girl aged 14-15 years. Reticulum cell sarcoma of post nasal space with a large ulcerating secondary gland mass in right neck. She presented because of brachial and cervical plexus neuralgia.

Age Incidence: Very few Africans know their age exactly. With some patients it is possible to work out an approximate age, for instance if their circumcision year is known, otherwise the patient's age must be guessed at. Bearing this in mind, it will be seen from Table VI that the average age of patients is much lower than is usual in England.

III. Malignant Growths of the Nose and Anterior Group of Nasal Sinuses in Adults

This group of cases formed 8·5% of the total number of cases of malignant disease admitted during the five year period 1954–1958. As with growths of the post-nasal space, the condition is usually far advanced before the patient seeks treatment (Figs. 11 and 12).

TABLE VI.

SHOWS THE APPROXIMATE AGE INCIDENCE, WITH SOME REFERENCE TO PATHOLOGY OF 61 PATIENTS WITH A PRIMARY GROWTH IN THE POST-NASAL SPACE.

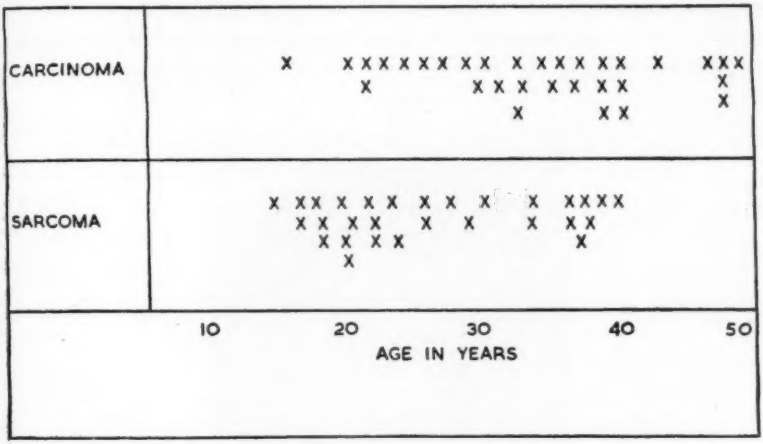


FIG. 11.

Boy aged about 20 years with an anaplastic carcinoma of the right antrum—upper and outer quadrant.

The presenting symptoms and signs depend on the site, the nature of the tumour and the presence or absence of infection, and are generally those due to spread of the growth outside the sinus of origin. Teeth usually have been removed when the patient is first seen. Nasal obstruction and epistaxis are not uncommon but orbital displacement and malar swelling are generally very pronounced before the African patient becomes concerned.

FIG. 12.

Arab about 28 years. Large ulcerating fibro-sarcoma of the left nostril and antro-ethmoidal area. The results of excision are shown on Figs. 25 and 26.

Surgical Anatomy: Öhngren's (1933) classification is widely used in Europe but because African patients present with the disease in a more advanced state, a simpler classification has been adopted, which has been found more useful in deciding on treatment and prognosis.

(*a*) Antro-ethmoidal—growths arising in the superior maxilla or ethmoidal labyrinth. Extension may occur into the nasal cavity, into the tissues about the orbit, into the anterior cranial fossa or laterally into the zygomatic or temporal area.

(*b*) Antro-alveolar area—growths arising in the inferior part of the maxilla and alveolus. These may involve the nose, the alveolus and palate, or the pterygo-maxillary fossa and may spread to involve the soft tissues of the cheek.

Pathology: As will be seen from Table VII, epithelial growths formed more than 70% of the cases, and males were affected more than twice as frequently as females. The small round cell sarcoma of the maxilla,

occurring in African children is excluded from this section as it is most likely a secondary deposit. The antro-alveolar area was the commonest site and undifferentiated anaplastic lesions formed the largest epithelial group. Gland metastases were present in 22 cases of the 40 epitheliomata (55%) and in 6 of the 16 sarcomata (37·5%). This incidence is much higher than

TABLE VII.

SHOWS THE SITE, SEX, HISTOLOGY AND REGIONAL GLAND INVOLVEMENT IN 56 CASES OF MALIGNANT DISEASE OF THE NOSE AND ANTERIOR GROUP OF NASAL SINUSES.

Type	Male	Female	Site		Glands			
					Palpable			Considered inoperable when first seen
			Antro-ethmoid	Antro-alveolar	None	Unilat.	Bilat.	
Epithelioma (71·5%):								
Keratinized	7	1	3	5	3	4	1	0
Anaplastic	11	4	7	8	2	5	8	7
Adenocarcinoma ..	5	4	3	6	5	2	2	2
Malignant Adamantinoma	3	—	—	3	3	—	—	—
Melanocarcinoma ..	1	2	1	2	3	—	—	—
Columnar	2	—	1	1	2	—	—	—
Totals	29	11	15	25	18	11	11	9
	40							
Sarcoma (18·5%):								
Osteoclastoma	3	—	—	3	3	—	—	—
Myeloid or Fibrosarcoma	2	3	1	4	4	1	—	—
Chondro-Myxo-Osteo-sarcoma								
Spindle Cell	2	1	1	2	1	2	—	—
Lymphosarcoma ..	4	1	2	3	2	3	—	3
Totals	11	5	4	12	10	6	—	3
	16							

that reported from European sources (29–38%) and indicates the advanced state of the disease when these patients were first seen, for it is generally accepted that regional metastases do not occur until the growth has extended through the bony wall of the cavity of origin, as the lymphatic supply to the submucosa of the sinuses is poor.

Treatment

Radiotherapy is not available in East Africa at present, therefore patients are treated by chemotherapy or radical surgery, or by a combination of these methods. Radical surgery when undertaken, aims at being

curative. Chemotherapy has been used palliatively in cases unsuitable for surgery, but newer anti-tumour agents and different techniques suggest that chemotherapy has a place as a surgical adjunct. Certain tumours have shown a very remarkable and promising response to treatment with some of the newer agents, but it is much too early as yet to assess the true place of these drugs.

Table VIII outlines the principles of treatment adopted for the three tumour groups described:

TABLE VIII.

METHODS OF TREATMENT.

Tumour Type	Treatment			
	Radical exenterative surgery	Nitrogen Mustard	Metabolite Anti-metabolite combination	Sarcolysin or Melphalan
Hutchison's Syndrome in Children	No place	Very good palliative response in most cases	No place	?
Growths of post-nasal space	No place	Very good palliative reponse in most cases but large doses must be given, using autologous marrow infusions or intermittent aortic occlusion.	No place	Not tried
Tumours of the nose and anterior group of nasal sinuses	With selected cases can be curative	Not tried	Very useful as a surgical adjunct	Useful with Lympho-sarcomata

In the past, children with the small round cell tumour of the maxilla underwent surgery because the true nature of the condition was not understood. It is now realized that the maxilla or mandible tumour is always associated with deposits in other areas and that purely local treatment is valueless. Many, but not all of these tumours are extremely sensitive to nitrogen mustard. Routinely, they are given ·2 mgm. per kilo body weight daily for five days. This course may be repeated at the end of three weeks if the blood picture has remained, or returned to normal. It is not understood why tumours, clinically and histologically similar, vary in their response to nitrogen mustard, some showing a remarkable and rapid regression, while others are unaffected. A host factor may be responsible. Untreated children with this condition may live for 6–12 weeks after admission; treatment with nitrogen mustard prolongs this period, in one case for 19 months, but to date in the 21 cases treated, none have been cured.

FIG. 13.
Girl aged about 18 with lymphosarcoma involving left antrum, and soft tissues of left face and neck.

Melphalan or Sarcolysin has proved to be of value in a case of lymphosarcoma of the left face, unsuitable for surgery or regional perfusion (Figs. 13 and 14).

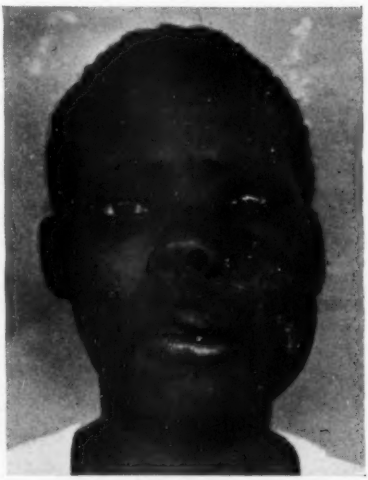


FIG. 14.
Girl shown on Fig. 13 after treatment with Sarcolysin.

It is possible that the best line of treatment for tumours unsuitable for surgery and beyond the scope of external carotid perfusion, will lie with the use of high doses of a short-acting anti-tumour agent, intermittent aortic occlusion being used to limit the effects of toxicity.

Adolescents and adults with post-nasal space growths are already outside the scope of surgery when first seen. Even if the primary growth could be controlled, the neck glands are inoperable. Lambert (1960), quoting Douglas, states "block dissection of the glands in this group of cases is a very disappointing and almost useless procedure, and doubts whether it has any place in the treatment of this condition". We have only attempted to provide palliative relief for these patients using nitrogen mustard. This drug is of very definite value in the alleviation of pressure symptoms, and it is our impression that the anti-tumour response is in most cases proportional to the dosage given. Very large secondary cervical gland masses causing severe cervical or brachial plexus neuralgia, require large doses to produce a worthwhile reduction in size. Routinely, we use 1 mgm. per kilo body weight, given as ·2 mgm. per kilo body weight, daily for five days. Eighteen patients have been treated with doses varying from 1 to 1·25 mgm. per kilo body weight, without fatality and with good palliative effect. Of nine patients given 1·5 mgm. per kilo body weight, two died and seven had good symptomatic relief. A total body dose of 2 mgm. per kilo body weight may be safely used if supplemented with autologous marrow infusion (Clifford, Clift and Duff, 1961). Larger doses than this, even with autologous marrow infusion are always fatal due to direct gastro-intestinal damage and septicæmia. Death occurs before the marrow graft has time to develop and reconstitute the body defence mechanism.

Anti-metabolite—Metabolite combination using regional intra-arterial methotrexate and intra-muscular citrovorum factor, as described by Sullivan, Miller and Sikes (1959), is of little value in the treatment of post-nasal space tumours, as it is impossible to perfuse adequately the secondary cervical gland deposits. A method of regional perfusion using intermittent aortic occlusion, developed in this department by Duff and Dennis, is at present under study; it is hoped that this method will allow the administration of large doses of an anti-tumour agent to the head and neck area, and that the unaffected marrow of the lower limbs and pelvis will prevent the development of agranulocytosis.

Surgical Treatment: Standardized procedures have been developed for cases of antro-ethmoidal and antro-alveolar malignancy considered suitable to undergo an operation, planned as curative. This of necessity has to be radical, but it must be borne in mind that without treatment the condition of these patients in the terminal stages of the disease can only be described as dreadful.

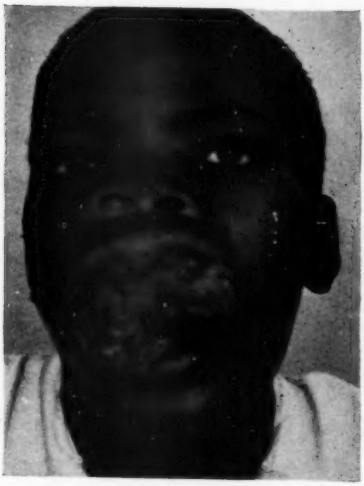


FIG. 15.

Girl aged about 20 years. Inoperable anaplastic carcinoma of right and left upper alveolus

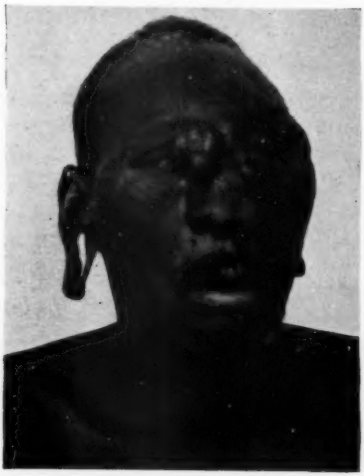


FIG. 16.

Adult male about 50 years. Adenocarcinoma of left antro-ethmoidal area which had crossed the midline and extensively invaded the right orbit and ethmoidal area. Inoperable.

We exclude as being unsuitable for surgery:

i. Growths of the posterior group of sinuses (posterior ethmoids and sphenoids).
ii. Metastatic tumours of the maxilla.
iii. Tumours which arise in the soft palate or peritonsillar area, which invade the alveolus, but not tumours arising in the vestibule of the nose or nasal cavity and such tumours as extensive rodent ulcers of the face with destruction of the underlying bone.

Contra-indications to operation:

i. The patient understanding the nature of his disease and the extent of the operation declines surgery.
ii. Age and condition of the patient which make operative interference unduly dangerous or may produce complete blindness.
iii. Highly anaplastic growths. In the light of our experience it is suggested that only well differentiated tumours offer a reasonable chance of success to surgery, and that such treatment has little or no value in the poorly or non-differentiated type of growth. In assessing the patient for operation or otherwise, the histology of the tumour must be considered together with the history, situation and rate of growth of the tumour.
iv. Bilateral and fixed neck glands or the presence of secondaries elsewhere.

The following are not regarded as contra-indications to operation.

i. Radiographic evidence of involvement of the floor of the anterior fossa as the dura is very resistant to invasion.
ii. Spread of the growth across the mid-line usually along the alveolar border as this may be dealt with by more extensive surgery.
iii. Trismus due to spread into the pterygo-maxillary fossa as this area will be removed as part of an en bloc excision.

Surgery aims at an en bloc removal of the tumour through an adequate margin of normal tissue.

Figures 17 and 18 show the line of excision for antro-ethmoidal and antro-alveolar growths. Poor results have always followed inadequate surgery, and it is contrary to accepted surgical principles to remove a malignant tumour piece-meal, working from the centre of the growth to the periphery. It is impossible to undertake an en bloc excision of the antro-ethmoidal area unless the orbit is exenterated and the pterygo maxillary fossa must be regarded as part of the antro-alveolar area. Figures 19, 20, 21, 22, 23, 24, 25, and 26 show patients who have undergone operation and, having been fitted with an obturator, were able to resume a normal way of life.

FIG. 17.
Line of bone excision used for an enbloc removal of an antro-ethmoidal growth.

FIG. 18.
Line of bone excision for an en bloc removal of an antro-alveolar growth.

FIG. 19.
Right antro-ethmoidal excision of a fibrosarcoma.

FIG. 20.
Patient shown in Fig. 19 fitted with an obturator.

FIG. 21.
Limited antro-alveolar excision of a right adenocarcinoma.

FIG. 22.
Patient shown in Fig. 21 fitted with an obturator.

FIG. 23.
Left antro-ethmoid excision of a squamous epithelioma.

FIG. 24.
Patient shown in Fig. 23 fitted with an obturator.

FIG. 25.
Patient shown in Fig. 12 after an en bloc excision of the involved area

FIG. 26.
Patient shown in Fig. 25 fitted with an obturator.

During the period under review, 56 patients with malignant disease of the nose and nasal sinuses were seen. Of these, 47 were surgically treated with an operative mortality of 10·6%. Details of the surgical management of these patients and post-operative results have already been described, (Clifford 1960). It will be noted that histologically well differentiated tumours and growths of the antro-ethmoidal area have the best prognosis.

Chemotherapy as a surgical adjunct:

At present, all malignancies of the anterior group of sinuses lying within the area supplied by one or both external carotid arteries, whether classified as antro-alveolar or antro-ethmoidal, are initially treated by the external carotid perfusion technique, using methotrexate and leucovorin as described by Duff, Sullivan, Miller, Ulm, Clarkson and Clifford, 1961. In some cases this has produced an immediate decrease in the size of the tumour and subsequent excision has been easier and less radical. It is possible that through the use of this technique, growths previously thought to be outside the scope of surgery may be considered operable. Unlike radiotherapy, regional chemotherapy perfusion does not affect the viability of the tissues, and bone or skin flap necrosis has not proved a problem to date.

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I wish to thank Professor F. Ormerod and Dr. I. Friedman for inviting me to give this lecture. I also wish to thank Dr. Friedman for his reports on the many histological sections sent to him from Nairobi. I am grateful to Professor Alexander Haddow, F.R.S., Director of the Chester Beatty Institute, for his interest and for a supply of Melphalan.

The work in my department is undertaken by many willing hands but I am more than indebted to Dr. John Dennis who has anæsthetized all the patients treated surgically. Dr. John Duff, Registrar to the Department, has developed the method of carotid catheterization and intermittent aortic occlusion which we use. Mr. R. A. Clift has been responsible for all the blood and marrow studies undertaken on patients undergoing chemotherapy. Dr. R. D. Sullivan and Dr. H. F. Oettgen from the Division of Clinical Chemotherapy of the Sloan Kettering Institute for Cancer Research, New York, have introduced the regional infusion techniques to East Africa. The Sloan Kettering team working at the King George VI Hospital have proved stimulating and pleasant colleagues, and we are grateful for their advice and assistance.

There is an enormous field for clinical research in East Africa where more doctors are desperately needed. We wish that our British colleagues were less security minded and more conscious of the opportunities that lie in Africa.

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CHRONIC OTITIS MEDIA AND TETANUS

By N. K. APTE (India)

THE purpose of this article is to study the incidence of tetanus due to chronic otitis media in free hospitals, and the problems faced by an ear, nose and throat surgeon. The attendance at free hospitals is mainly from patients from working class and poor section of population.

Chronic otitis media has been known for a long time as one of the channels of infection for tetanus. It is interesting to know that this channel of infection is more frequent than leg ulcers in tropical countries.

The following is a record of 98 cases of tetanus due to chronic otitis media at J. J. Hospital, Bombay, during 1955-1959. These statistical figures cannot be compared to those of private hospitals where these cases are rare.

TETANUS CASES (DUE TO CHRONIC OTTIS MEDIA (1955 TO 1959))

TABLE I.

Age	Cases
1 to 10 years	71
10 to 20 years	7
20 to 40 years	14
40 to 60 years	6
Total	98

TABLE II

Sex	Cases
Male	63
Female	35
Total	98

TABLE III

CHANNEL OF INFECTION

	Cases
1 C.O. Media only	95
2 C.O. Media associated with boils, exanthematous eruptions history of tooth extraction.	3
Total	98

TABLE IV

DURATION OF OTORRHŒA

	Cases
One month	41
Six months	17
One year	10
Two years	11
More than two years	17
No proper history	2
Total	98

TABLE V

DURATION OF TRISMUS (Before admission)

	Cases
1–4 days	93
4–8 days	5
Total	98

TABLE VI.

HOSPITALIZATION

Duration	Cases
One Week	39
Two Weeks	45
Three Weeks	10
Discharged against Medical advice	4
Total	98

TABLE VII.

Results:—	
Total cases	98
Cured	82
Died	12
Discharged against medical advice	4
Total	98

TABLE VIII.

COMPARATIVE FIGURES OF ALL TETANUS CASES FOR 5 YEARS (1955–1959).

	Total number	Cured	Died
Tetanus due to other causes	793	581	212
Tetanus due to C.O. Media	98	86	12
Total Cases	891	667	224

TABLE IX.

INCIDENCE

	Cured	Died
Tetanus due to other causes	73·14%	26·98%
Tetanus due to C.O. Media	37·75%	12·25%
Total Cases	74·86%	25·14%

The majority of cases were admitted to the medical wards directly and then referred to E.N.T. Surgeon for the ear discharge. A small percentage of cases were seen in the out-patients' Department by the aural surgeon and then referred to the physician.

Regarding the channel of infection one has to rely on the history and clinical examination. It is impossible to establish with certainty the channel of tetanus infection in some cases as these patients may have several cutaneous abrasions or may get the infection superadded to an already existing infection as in boils, exanthematous eruption etc. This uncertainty does persist in a few cases. Most of the cases in the present series had necrotic otitis media with a big perforation.

Unhygienic surroundings and ignorance regarding personal hygiene and superstitions were responsible for the infection. History was suggestive of mode of the infection in some cases:—

(1) History of cleaning the ear by a match stick by the patient or by a metallic instrument by a quack.

(2) Instillation of spurious medicines e.g. crushed leaves, grass, milk, dust etc.

The infection may have also been introduced and its spread enhanced by:

(1) Syringing the ear as is frequently done for all ear complaints irrespective of the disease.
(2) Instillation of hydrogen peroxide in otitis media.
(3) Packing the external auditory canal tightly by Sulfa or Boric powder.

An early diagnosis of tetanus is imperative on the part of the Ear, Nose and Throat Surgeon. The usual symptoms are:

(1) Pain in the ear or neck or tenderness over the sternomastoids.
(2) Difficulty in opening mouth.
(3) Difficulty in speech.
(4) Difficulty in swallowing (spasmodic) of recent onset.

The Trismus due to tetanus may be inadvertently attributed to peritonsillar cellulitis, temporo-mandibular arthritis or functional causes in a hurried examination at out-patients' Department. The typical tetanic convulsions may not occur for 48–72 hours after the onset of trismus. All doubtful cases were admitted for observation.

Prognosis

The mortality was about 12% in cases due to chronic otitis media. Mortality was high in children; the common cause of death being bronchopneumonia and hyperpyrexia. In the present series only one case developed postoperative tetanus after mastoid operation which was fatal. Postoperative tetanus has been known to carry almost 100% mortality rate.

Treatment

A.T.S. serum was given after testing sensitivity; 100,000 units for adults and 50,000 units for children. The A.T.S. was given with 5% glucose saline by drip method. 1 c.c. of Antistin, Adrenaline 1 c.c. (1:1000) Atropin Gr. 1/100, 5 c.c. of 1% Novocaine, 10 c.c. 10% Calcium Gluconate, Largactyl 25 mgm. were also incorporated in the glucose saline drip. Sedation was by Pot. Bromide, Largactyl or Seconal sodium. Procaine penicillin was given intramuscularly daily. Fluid balance was adequately maintained, the feeding being by nasal feeds.

Cortisone was used in a few cases. Curare was not used in any of the cases to control spasms.

Tracheotomy was necessary in four cases.

Case Reports of two unusual cases in the present series:

CASE I

Post-Operative tetanus: Miss K., age 19, with history of ear discharge and headache, duration five years, was operated on for chronic mastoiditis with cholesteatoma and developed tetanus on 9th postoperative day. Patient expired in spite of the usual treatment on the 15th day.

CASE II

Recurrent tetanus: A boy aged 7, with a history of discharge from ear twice for 3 years, developed tetanus twice during the period of one year. Patient had a marginal perforation of the drum and a sclerotic mastoid. The case was referred to E.N.T. side for advisability of an operation to prevent future recurrence. As surgery has no place in the prevention it was decided to immunize the child by A.P. Toxoid by two doses at intervals of 6 weeks and keep the patient under observation in future for intracranial extension.

Summary Conclusions

A record of 98 cases of tetanus due to chronic otitis media during the last 5 years has been given. The incidence is high in free hospitals where people from poor section of the population attend. The incidence is high in children. The sources of infection and the problems faced by the E.N.T. Surgeon regarding diagnosis are discussed. The disease must be seen in their multicausal aspects and against the background of cultural level of patients. The environmental sanitation would improve with health education. A prophylactic triple antigen in the pediatric department for all cases at O.P.D. would help a great deal in reducing the incidence. A prophylactic A.T.S. dose before operation on a grossly infected mastoid is worth consideration.

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A TRIAL OF SULFADIMETHOXINE, A LONG-ACTING SULPHONAMIDE, AND PENICILLIN IN ACUTE OTITIS MEDIA

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A LARGE number of antibacterial agents is used for the treatment of acute otitis media (Medical Research Council, 1957). The choice of therapy is often empirical, and in the majority of patients treatment may not even be necessary (Fry, 1958). However, in view of serious complications, such as deafness, mastoiditis or meningitis, it is important to determine optimal therapy and specific indications for the antibacterial agents available.

We report a trial comparing the efficacy of orally administered sulfadimethoxine*, a long-acting sulphonamide, with intramuscular penicillin in the treatment of acute otitis media in children.

Clinical Material and Methods

The 224 children admitted for this study were consecutive untreated patients with acute otitis media seen by the authors at the pædiatric outpatients' department of the Johns Hopkins Hospital, Baltimore, between December 1958 and June 1959. For inclusion to the trial the children must have had:

(1) An illness of less than seven days duration
(2) No additional abnormality apart from nasopharyngitis.
(3) No antimicrobial therapy during the previous month.
(4) No history of allergy to penicillin or sulphonomides.

The diagnosis was based on the finding of a tympanic membrane which was unequivocally red. The term "catarrhal" otitis media was avoided because of the implication that this condition may be a distinct entity to "Purulent" otitis media. Instead, we have described the clinical findings such as bulging of the tympanic membrane or the presence of purulent otorrhœa with perforation of the tympanic membrane so that a comparison could be made between the therapeutic responses of mild and severe cases. Hearing was assessed by observing the response of the child to whispered words or sudden sounds.

A relapse was defined as a recurrence of the acute illness within an

* The trade name of Hoffman-La-Roche, Inc., for sulfadimethoxine is Madribon.

arbitrary period of twenty-three days from commencement of treatment.

The nasopharynx and any aural discharge were cultured both aerobically and anaerobically. Antibiotic sensitivity tests were performed by the disc method.

The patients were allocated at random into one of two groups. It can be seen in Tables I, II and III that these groups were comparable in bacteriological flora, and clinical characteristics. Bilateral infections took place in 41 patients in each of the sulfadimethoxine and penicillin groups.

Patients in Group 1 were treated with sulfadimethoxine suspension, the dose being related to body weight:

(*a*) Under 40 lb: 0·5 G in a single dose on the first day followed by 0·25 G once daily for nine days.

(*b*) 40–80 lb: Same schedule as *a* but each dose was twice as large.

(*c*) Over 80 lb; Same schedule as *a* but each dose was three times as large.

TABLE I.

THERAPEUTIC FAILURES RELATED TO NASOPHARYNGEAL BACTERIAL FLORA*

	Failed to Clear by 9th day					
	Penicillin			Sulfadimethoxine		
	Total	No.	%	Total	No.	%
Pneumococcus	23	2	8·7	26	4	15·4
Hæmophilus Species ..	6	1	16·7	10	1	10·0
β-Hæmolytic Streptococcus ..	0	0	0	1	0	0
Staphylococcus aureus ..	11	4	36·4	13	2	15·4
Mixed "Pathogens" ..	14	2	14·3	12	4	33·3
"Commensals"	33	11	33·3	29	6	20·7
No Growth	1	0	0	0	0	0
Not Known	1	0	0	1	0	0
Total ..	89	20	22·5	92	17	18·5

* Not including failures due to drug reactions.

TABLE II.

THERAPEUTIC RESPONSE OF CASES WITH AND WITHOUT PURULENT DISCHARGE*

Purulent Otorrhœa	Penicillin			Sulfadimethoxine		
	Total	Failures	% Failures	Total	Failures	% Failures
Present	19	3	15·8	17	8	47·1
Absent	70	17	24·3	75	9	12·0

* Not including failures due to toxic reactions to drugs.

TABLE III.

RELATION OF CLINICAL FEATURES TO THERAPEUTIC RESPONSE*

Clinical Features		Penicillin			Sulfadimethoxine		
		Total	Failure	%Failure	Total	Failure	%Failure
History more than 2 days	+	26	7	26·9	29	6	20·7
	−	63	13	20·6	63	11	17·5
Associated nasopharyngitis	+	60	15	25·0	65	11	16·9
	−	29	5	17·2	27	6	22·2
Bulging of the tympanic membrane	+	9	1	11·1	11	2	18·2
	−	80	19	23·8	81	15	18·5

* Not including failures due to toxic reactions to drugs.

Patients in Group 2 were treated with intramuscular penicillin as follows:

(*a*) Under 40 lb: Procaine penicillin G in aqueous suspension* 300,000 units daily for three days and in oily suspension 300,000 units on the fourth and sixth days.

(*b*) 40–80 lb: Same schedule as *a* but each dose was twice as large.

(*c*) Over 80 lb: Same schedule as *a* but each dose was three times as large.

Progress was assessed by the authors on the third, sixth and ninth days. To eliminate any personal bias throughout the study the authors were not aware of the therapy administered. Treatment was considered successful if otorrhœa, redness or bulging of the tympanic membrane had disappeared by the ninth day.

Results

A similar therapeutic response was obtained in the two treatment groups (Table IV). Thus a successful response was obtained in 75 (80·6%) of 93 patients treated by sulfadimethoxine and in 69 (73·4%) of 94 patients treated by penicillin (P=0·32).

The only toxic reactions encountered were rashes. One occurred in the sulfadimethoxine group, a generalized maculo-papular exanthem, and five in the penicillin group, two of which were maculo-papular and three urticarial. All eruptions disappeared one to three days after the drugs were discontinued. When rashes occurred therapy was considered to have failed.

* The trade name of Squibb and Sons, New Brunswick, N.Y., for Procaine Penicillin G in aqueous suspension is Crysticillin.

TABLE IV.

COMPARISON OF RESULTS WITH PENICILLIN AND SULFADIMETHOXINE

	Penicillin		Sulfadimethoxine	
	Number	%	Number	%
Success	69	73·4	75	80·6
Toxic Reaction	5	5·3	1	1·1
Failure	20	21·3	17	18·3
Total	94	100·0	93	100·0

When the overall results were broken down (Table II) it was found that the proportion of patients failing to respond to sulfadimethoxine was significantly higher in those with purulent aural discharge (8 out of 17, 47%) than in the remainder (9 out of 75, 12·0%) P=0·004. No such trend was observed in patients treated with penicillin.

In children with purulent otorrhœa, a slightly higher proportion responded to penicillin than sulfadimethoxine (Table II), the opposite trend being observed in children without otorrhœa, these differences however, are not significant at the five per cent. level (P=0·094 and 0·079 respectively).

The relation between nasopharyngeal bacterial cultures with therapeutic results is shown in Table I. The differences in response are not significant at the five per cent. level, but it is noteworthy that in patients where *Staphylococcus aureus* was recovered the failure rate was greater in the penicillin (36·4%) than in the sulfadimethozine series (15·4%). In ten cases penicillin-resistant staphylococci were recovered. Six of these were treated with sulfadimethoxine with only one failure. The other four were treated with penicillin; an unsuccessful response was obtained in two. The cases in which members of the hæmophilus species were the only potential pathogens recovered had a favourable response with both penicillin (failure rate 16·7%) and sulfadimethoxine (failure rate 10·0%), although 33% were penicillin-resistant according to *in vitro* sensitivities. No relation was observed between the therapeutic response and the bacteria cultured from the aural pus or their *in vitro* sensitivities. However, when the 36 cases with purulent otorrhœa were analysed according to the pathogens isolated from the aural discharge, the number of patients in each category was too small for adequate assessment and is therefore not reported.

The rate of relapse by the 23rd day did not differ significantly in the sulfadimethoxine or the penicillin series, there being two relapses in the 34 cases examined in the sulfadimethoxine-treated group (5·9%) and five relapses in the 47 cases in the penicillin group (10·6%).

No significant relation was found between the therapeutic response and the clinical features, other than aural discharge. Thus, neither the length of history, the past history of recurrent attacks of acute otitis media, the history of antibiotic administration during the three months before the infection, the severity of the infection, nor the association of nasopharyngitis, significantly altered the response to treatment.

At follow-up examination on the twenty-third day deafness was not found in any of our patients.

Discussion

In the present study the response to sulfadimethoxine was significantly worse when purulent otorrhœa was present than when it was absent, the possible inhibition of sulfadimethoxine by tissue exudates must therefore be considered. When purulent otorrhœa was present a small difference was observed in the therapeutic response of the two treatment groups, the failure rate of the sulfadimethoxine group being higher than that of the penicillin group.

Fry (1958) found that in 522 attacks of acute otitis media only 22% required antibiotics. The benign course of the majority of middle-ear infections should, therefore, be kept in mind when evaluating results of therapy. However, in view of the serious complications which may follow otitis media, it was decided not to include a control group of children with no antimicrobial therapy, but to compare the results of a relatively new antibacterial drug with what is regarded as an optimal course of treatment with intramuscular penicillin (Otty, 1960).

Of the 37 patients excluded from the study because of failure to attend five were in the sulfadimethoxine and 32 in the penicillin group. If all the dissenters in both groups had been counted as successes, the smaller percentage of failures in the sulfadimethoxine group is not statistically significant. Moreover, if all the penicillin dissenters had been counted successes, the sulfadimethoxine dissenters either as all successes or all failures, our conclusions would not have been altered significantly ($P=0{\cdot}9$ and $P=0{\cdot}60$ respectively).

The properties of sulfadimethoxine have been described (Brandman *et al.*, 1959; Daeschner, 1959; Townsend and Borgstedt, 1959) and it appears established that adequate single daily doses administered orally will maintain therapeutic blood levels.

The nasopharyngeal bacterial flora in healthy subjects and in patients with upper respiratory infection has been studied by several workers (Kolmer *et al.*, 1948; Goldman, 1950; Willard and Hansen, 1958, 1959; Goslings and Büchli, 1958) and the literature has been summarized recently by Michael (1959) who reported a series of 1,000 cultures of the upper respiratory tract. Our observations in acute otitis media are similar to those of the latter author in respiratory infections. Thus,

isolation of a particular organism was not a helpful guide to the selection of treatment.

Summary

1. A clinical trial was undertaken to compare the efficacy of orally administered sulfadimethoxine, a long-acting sulphonamide, with intramuscular penicillin in the treatment of acute otitis media in children.

2. A similar therapeutic response was obtained in the two groups when the overall results were considered.

3. In the group treated with sulfadimethoxine, there was a significantly higher proportion of failures in patients with purulent aural discharge than in the remainder. No such trend observed in patients treated by penicillin.

4. A higher proportion of patients with purulent otorrhœa responded to penicillin than to sulfadimethoxine and the opposite trend was observed in children without purulent otorrhœa. These differences however, were not significant at the five per cent. level.

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TREATMENT OF CHRONIC ORO-ANTRAL FISTULA BY COMPLETE PALATAL FLAP

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Introduction

ORO-ANTRAL fistula is a condition, in which the antrum communicates with the oral cavity through a fistulous tract. The commonest cause of the fistula is dental extraction. Other causes of the condition are dental infection, sinus infection, cysts, tumours, trauma, etc. Clinically, fistulae are divided into two main groups—(1) Acute cases—those in which the condition is present up to fourteen days from its occurrence. These acute types of fistulae heal spontaneously, in most cases with good care of antral infection. In some of them, primary suture of the defect is done with success, if the condition is recognized within twenty-four hours of its occurrence. (2) Fistulae which have been present for fifteen days or more are classified as chronic type. It is these chronic cases of oro-antral fistulae which have tried the ingenuity of surgeons in their effective treatment. As a result of this, there are plenty of methods suggested for the closure of the chronic oro-antral fistulae. Some of the methods lately have given quite encouraging results but none of them is without recurrence and gives consistently successful results. Another drawback is that the methods employed are not suitable for all cases of fistulae (especially the large variety).

In this paper we intend to present the method of treatment which we have followed in twenty-five consecutive cases of oro-antral fistulae without a recurrence. The idea of the complete palatal mucoperiosteal flap was taken from the cleft palate operation.

Material and Methods

Twenty-five cases of chronic oro-antral fistulae which have been treated from 1954 to 1959 have been taken. All were operated by the method described later. In all our cases, the cause of fistula was dental extraction. The age of the patients varied from 30 to 60 years, average age being 48 years. Male to female ratio was 3:2.

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Presenting symptoms were as follows:

1. Dribbling of water from the nose on drinking.
2. Escape of food particles from the nose.
3. Pus coming out from the fistula and bad smell and taste.
4. Attacks of maxillary sinusitis.
5. Two cases had pain locally—probably due to osteomyelitis.

Duration of symptoms varied from four months to one year. All cases had a history of previous tooth extraction. Five of these cases had already been operated previously and had a recurrence. Two of these were our cases, in which previous operations were done with cheek flap and the other three were operated elsewhere.

Pre-operative skiagrams were taken in all cases. All of them showed hazy sinuses. None had a displaced tooth or root.

Short Review of Methods Tried Previously

Treatment of oro-antral fistula is divided into two main parts:

1. Treatment of antral infection either by antrostomy or Caldwell Luc Operation and antibiotics.
2. Plastic repair of the fistula.

Broadly speaking, this falls into four main groups;

(*a*) Direct suturing of the freshened edges of the fistula—Hargrove's method.

(*b*) Buccal flap methods:
- i. Axhausen's U shaped buccal flap.
- ii. Major's sliding buccal flap.
- iii. Hill's hinged buccal flap.
- iv. King's modification of Axhausen's method.

(*c*) Partial palatal flaps:
- i. Welty's palatal flap operation with median palatal incision.
- ii. Ashley's palatal flap method.
- iii. Russell's bridged palatal flap.

(*d*) Combination of buccal and palatal flap:
- i. Dunning's method.

Comments on the above methods are offered later.

Operations done in our Series

General anæsthesia was conducted by trans-nasal intratracheal intubation. Roller pack was put around the tube to prevent any blood going into the respiratory tract.

1. A midline palatal incision was made all along the hard palate. Anteriorly the incision follows the curve of the palate. As the lateral

border of the palate was approached, the incision was made to go across the fistulous opening and was extended well behind the fistula.

2. A mucoperiosteal palatal flap was elevated from the hard palate (as in cleft palate operation) till the greater palatine vessels were reached. This mobilization allows free lateral swinging of the flap and allows tensionless suturing. The large flap thus elevated is quite enough to cover even a large sized fistula, which results after removal of the osteomyelitic bone and alveolectomy.

3. Buccal flap is elevated as in Caldwell-Luc's operation up to infra-orbital foramen. Antero-lateral wall of the antrum is opened and Caldwell-Luc's operation is done (removal of all mucous membranes and intra-nasal antrostomy). Antrum was packed with penicillin and streptomycin powder and Bipp pack, for 48 hours.

4. Epithelium and granulation tissue along the tract is scraped out, diseased alveolus is nibbled away, and edges of the defect are made even. Spiky edges might damage the flap.

5. Alveolectomy was done until the fistulous opening is almost at the same level as the palate.

6. One tooth in front and one behind the fistula (if not already fallen or removed) are removed in all cases. This is an important step of the operation as it facilitates the lateral swinging of the palatal mucoperiostal flap without jeopardizing its viability (tooth edges might press over the blood vessels of the turned flap). More space in front and behind the fistula allows this large flap to lie well beyond the opening and cover the defect well beyond its margins (in small flaps where tissues contract, a small recurrence at the edge of the flap is quite a common occurrence).

7. Now a palatal flap is swung over the defect so as to cover it completely on all sides (this is easy if mobilization is complete). The edges of the flap are sutured to the edges of the elevated cheek flap with few silk sutures. Suturing should be without even slightest tension, as this is a vital factor in successful closure of the fistula. One of the important points in this method is that the suture line is well beyond the opening of the fistula. In some of the methods tried to close the fistula, the suture line of the repair is either over the fistula, or very near to the edge. This is not desirable, as breaking of the sutured area is likely to give rise to recurrence. Further away the suture line from the fistula, the greater is the assurance against its recurrence.

8. In all cases except the last two, Bipp pack was put over the wound and the whole palate, and retained *in situ* by 2–3 transverse sutures across the palate. The idea of the pack was to prevent sagging of the palatal flap and tension over the suture line. Firm contact of the palatal flap with the raw area aids healing and prevents infection, oozing and hæmatoma formations, all of which are likely to give recurrences. In the last two cases, this packing was omitted without any ill effects.

FIG. 1.
Drawing showing line of incision and fistula.

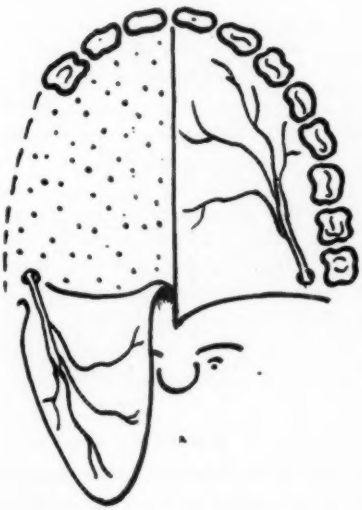

FIG. 2.
Mucoperiosteal flap is elevated and turned: it shows the greater palatine vessels coming from the greater palatine foramen to the flap.

Post-Operative Care

Injections Penstrep were administered for six to eight days. Fluids were allowed to be sucked through a straw on the same evening and continued for four to five days. This is to prevent the soiling of the gauze with fluids. After removal of the palatal pack on the sixth or seventh day, flaps and wounds were clean and healing was in progress. Sutures were allowed to fall off by themselves. Use of straw may not be essential as it is

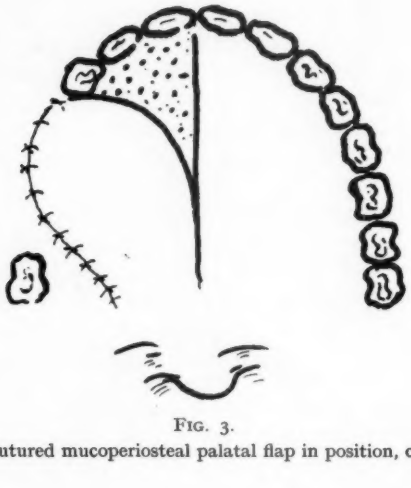

FIG. 3.
Diagram showing sutured mucoperiosteal palatal flap in position, covering the fistula.

observed that many cases of my cleft palate operations (Dr. L. H. Hiranadani) in children, who start drinking fluids without straw, heal well. All the cases were fitted with dentures at the end of the third month. Above method of treatment has given consistent success in twenty-five consecutive cases of chronic oro-antral fistulae. Dental prosthesis has not been used in any of the cases. This is a great advantage over other methods in which some type of dental prosthesis is essential.

Discussion

In this series, 25 consecutive cases of oro-antral fistula were treated by the method detailed above. Idea of the complete palatal flap was taken from the cleft palate operation. The above method has been found to be 100% successful. There had not been a single case of recurrence in this method and hence we feel that this operation when done properly, can be a complete answer to any type of chronic oro-antral fistula.

Cheek flap operations have been tried. These flaps are thin, less mobile

and less vascular than the palatal flaps. There is great likelihood of tension on suture line, with the movements of the cheek. This factor alone can give rise to breaking of suture line and failure. To cover the defect and reach the palatal margin (beyond the fistulous opening) these flaps have to be long and very mobile, both of which might lead to inadequate nourishment of the flap. These factors may lead to defective and delayed healing and even partial necrosis of the flap—an important cause of failure. Even if it is successful in closing the fistula, the most important objection to this thin flap is its inability to withstand the pressure of biting or denture and late necrosis of the flap. This procedure was attempted several times before the palatal flap method, with immediate failure in some cases, and difficulty in fixing dentures for a long time in others. Being a thin flap, it used to ulcerate.

In some operations, two flaps are employed—a palatal and a buccal. The objections mentioned above for the cheek flap hold good except that each flap being shorter, chances of success are better.

Partial palatal flaps are inadequate for the closure of a fistula especially if it turns out to be a big one (size of the fistula might be quite big when it is curetted and the surrounding bone is removed). Partial palatal flaps—free or hinged, are likely to have precarious blood supply and hence fail. Being short in length, they are unsuitable for large defect. Even if it is able to cover the defect at the time of operation, recurrence at the edges of the defect is likely to occur when the tissue shrinks. Hence partial palatal flaps —free or hinged, whether employed alone or with a cheek flap, are not so successful. Here the suture line is also over the fistula or very near to its edges, with all its dangers.

Complete palatal flap as described above, is found to be very satisfactory. It can be sufficiently mobilized, without jeopardizing its blood supply. Main blood supply of this long thick flap is from greater palatine vessels, hence we can mobilize the flap up to greater palatine foramen. This gives a long viable flap, enough to cover any large defect, with assurance against recurrence.

Some people do the operation for oro-antral fistula by the trap door method, or with small flaps, without removal of the tooth in front and a tooth behind the fistula. Technically, the operation becomes difficult. Tooth edges might press upon the turned flap, reducing its viability, with more chances of sloughing and recurrence. At times it is difficult to cover the defect well beyond its margins and later when the graft shrinks, a small fistula recurs at the edge of the flap.

In our cases, we have always removed a tooth in front and a tooth behind the fistula (if present). This allows sufficient room to turn the palatal flap laterally to cover any large defect, well beyond the margins of the opening. The blood supply of the flap is not in danger from the pressure of tooth edges or uneven alveolus.

There is lot of discussion about the method of control of associated chronic sinusitis. Some people advise two stage operation—first one to eradicate the sinus infection, either by antrostomy or Caldwell-Luc's operation. This is to be followed after few days by plastic repair of the fistula. It is correct to think, that the sinus infection is impossible to get rid of, while the fistula is patent, even if you do the first stage operation. In this antibiotic era, we can effectively tackle the sinus infection, at the same time as the plastic repair.

Type of sinus surgery, viz., Antrostomy or Caldwell-Luc operation, has also been a subject of prolonged controversy. Many people advise the former operation; but it appears rather difficult to clear this chronic sinusitis by antrostomy alone, as we have found the antrum heavily infected in all cases. The antrum is usually full of polypoid masses or granulation tissue. It therefore appears that antrostomy may not be able to clear the sinusitis, and hence we have always done the Caldwell-Luc's operation—a surer method to control sinusitis of this type—in all cases with gratifying results. It is needless to say that if the cause of the fistula is an impacted root or displaced tooth, it should be removed.

In some cases, due to marked bone infection, alveolectomy had to be extensive, with the result that we are left with a much larger defect than thought pre-operatively. Type of the flap which is used in our cases is probably the only answer to such larger defects. Alveolectomy has come to be an established procedure in these cases. Edges of the alveolus should be made as smooth as possible, to avoid any danger of perforation of the flap. The long thick palatal flap can be sutured up to the cheek flap without tension and can cover up any type of defect. Because of the thickness of the flap, in spite of alveolectomy, repair looks like a normal alveolus post-operatively and dentures can be fitted and worn comfortably, without any danger to the flap.

Some people are inclined to think that if we raise the palatal flap from the hard palate, as well as remove all the mucous membrane, including the floor of the antrum, there is a possibility of necrosis of the hard palate and resulting perforation. In none of our cases did we have any necrosis of the hard palate. The palate forms the floor of the nasal cavity, covered with mucous membrane and the blood supply from this source might be quite adequate to keep palate alive. This might also be helped by some blood vessels, which cross the midline inside the palatine bone.

Support of the flap after plastic operations has been thought to be quite an important factor in the successful outcome. Many ingenious methods and materials have been employed to prepare the dental prosthesis for this purpose, e.g. dental paste, dental plates, acrilic plates and so on. For this, the help of an expert dental surgeon becomes essential, which might not be available everywhere. We feel that any type of dental prosthesis is not only unnecessary, but also harmful.

We have altogether omitted all dental prosthesis; instead we have used a Bipp pack in most of our cases as mentioned before. The idea of putting in any support is to keep the flaps in contact with the tissues, and prevent tension on the suture line, as there is a natural tendency for the flap to sag down. Support probably is useful in preventing infection, oozing and hæmatoma formation, all of which are detrimental to the successful outcome. A Bipp pack has also been employed in cleft palate operations.

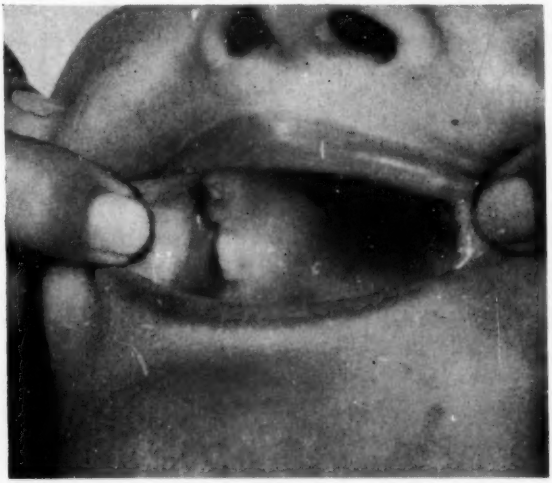

FIG. 4.

Photograph of a patient, showing a case of oro-antral fistula treated by the method of complete palatal flap. Even after alveolectomy because of the thickness of the flap, the alveolus looks normal. Operation is done on the right side. Both sides of the alveolus can be seen. Dentures can be comfortably fitted and worn.

In the last two cases of this series, the pack got dislodged from its position, as the patient was coming out of anæsthesia, and no further attempt was made to keep it in position. The idea behind this was that the sucking effect of the tongue after closure of the mouth should be enough to fullfil the function of the pack, except of course, the drawback of keeping the suture line open. In both these cases the fistula healed uneventfully, as in other cases with pack. Two cases of oro-antral fistula and one case of cleft palate have been treated without pack, with good results. But further trial should be given to this method, before the pack is altogether abandoned.

Summary and Conclusions

1. Twenty five cases of oro-antral fistula treated by complete palatal flap are presented.

2. Complete operation and post-operative care has been described in detail.

3. This method has given 100% success and can be used to repair any type of fistula.

4. Large, mobile, thick and viable mucoperiosteal palatal flap is a guarantee against recurrence. It enables us to cover a large defect, which results after alveolectomy.

5. Suture line in this operation is tensionless and well away from the fistulous opening. This is a great advantage as compared to other methods.

6. Caldwell-Luc's operation is probably the best to eradicate chronic antral infection associated with such fistulae.

7. No dental prosthesis is required in this method. This is a great advantage over the methods, in which some type of dental prosthesis is essential in the immediate and late post-operative period. Hence this operation can be done even in places where expert dental assistance is not available.

8. Bipp pack over the graft and palate serves the function of a support satisfactorily. Even this could be omitted after further trial.

9. Thick mucoperiosteal palatal flap gives an appearance of a normal alveolus, even after alveolectomy. Dentures can be fitted and worn comfortably three months after the operation.

10. This operation can be employed in all cases of fistulae with success and we recommend it for any type of oro-antral fistula.

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CLINICAL RECORDS

TRANSITIONAL CELL PAPILLOMA OF THE FRONTAL SINUS

By H. S. MILLAR* (Oxford)

BENIGN papillary tumours of the nasal cavity and sinuses are commonly classified into two pathological types:

(*a*) Squamous cell papilloma (often hard) arising from the nasal vestibule and anterior part of the nasal septum.

(*b*) Transitional cell papilloma (usually soft) arising in the nasal cavity and/or paranasal sinuses.

The following case "which is believed to be unique" is an example of the later type arising primarily in the frontal sinus.

Case Report

Past History

Mrs. M.L., aged 74 (Fig. 1), an elderly diabetic with bilateral cataracts and hypertension, first attended the E.N.T. Department of the Princess Margaret Hospital, Swindon, on *16.10.52*. She was complaining of a painless swelling arising beneath the inner angle of the right eyebrow and of chronic right rhinorrhœa.

Clinical examination revealed a soft, fluctuant, non-tender swelling arising from the floor of the right frontal sinus and, on anterior rhinoscopy, a large polypus arising from the right middle meatus.

An X-ray of the sinuses showed an opaque right antrum and an enlarged right frontal sinus with downward displacement of the floor.

A provisional diagnosis of mucocele of the right frontal sinus and chronic right maxillary sinusitis was made, and on *18.12.52* right intra-nasal antrostomy and simple nasal polypectomy were performed under local anæsthetic. The polypus was not sectioned.

Recent History

The patient was not seen again until 1959 during which time she had had two episodes of painful swelling above the right eye necessitating antibiotic therapy, and had developed diplopia. She was not complaining of any symptoms directly referable to her nose. At this stage she was kindly referred to the Radcliffe Infirmary by Mr. Colin Johnston.

* From the Department of Otolaryngology, the Radcliffe Infirmary, Oxford.

Clinical Findings

On *4.3.60* there was now a firm, fluctuant, painless swelling arising from the floor of the right frontal sinus displacing the eye downwards and laterally. The nose was clear except for some pus beneath the right middle meatus and a septum deviated to the left.

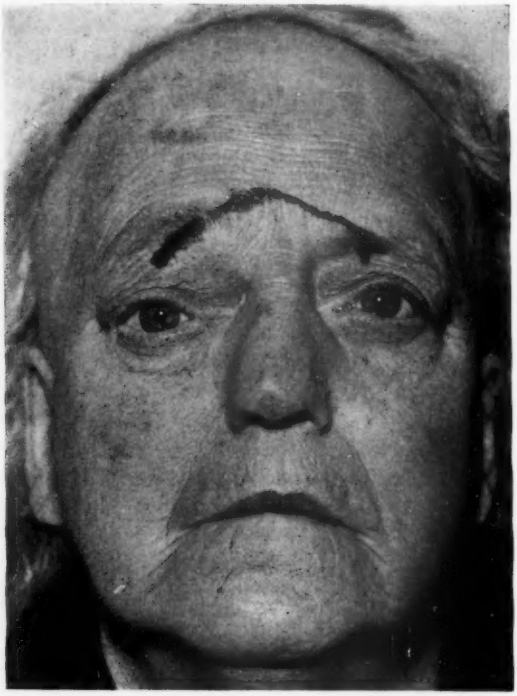

FIG. 1.
Pre-operative photograph of patient with frontal sinuses outlined.

Radiological Examination

Radiological examination of the sinuses (Fig. 2) showed enlargement of the right frontal sinus with downward displacement and thinning of the floor. and showed little change from the films of 1952. Mucocele of the right frontal sinus was still suspected and admission for surgery arranged.

Surgical Technique.

At operation on *30.7.60* by Mr. Ronald Macbeth, the osteoplastic flap approach to the frontal sinuses was used. On elevation of the anterior wall of the frontal sinuses a mass of red, vascular, papillary tissue was encountered filling the frontal sinuses (Fig. 3). The septum dividing the sinuses was completely

FIG. 2.

Occipito-frontal view with skin markers to allow accurate outlining of frontal sinuses.

FIG. 3.

Operative view of frontal sinuses filled with papilloma.

absent and the roof of the right orbit eroded. Also dura mater had been exposed in two places through the posterior wall of the right frontal sinus. The papillary tissue and residual mucosa was removed piecemeal as thoroughly as possible and both frontal sinuses converted into a single cavity together with the upper orbito-ethmoidal gallery of cells. A wide channel was made connecting the right frontal sinus with the nose and the osteoplastic flap replaced.

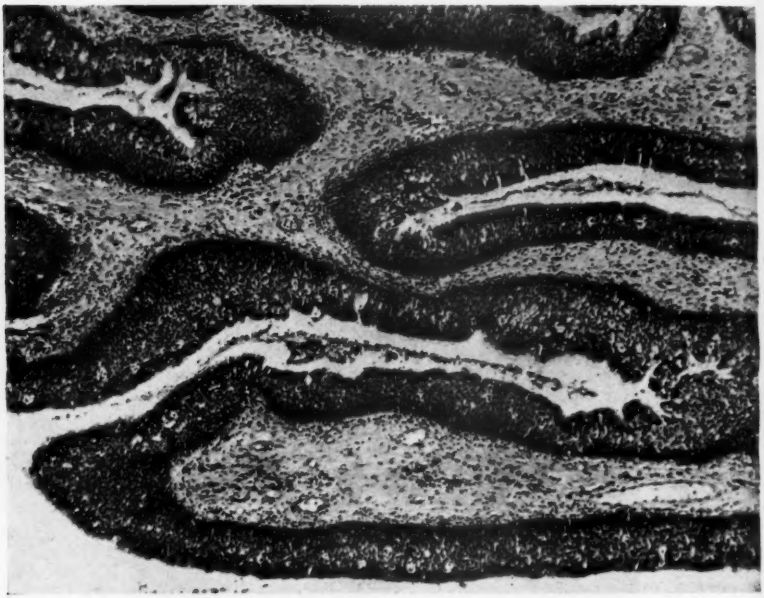

FIG. 4.
Photomicrograph of histology.

Post-Operative Course

Post-operative course was uneventful. Since discharge from hospital she has lost her diplopia and has remained free from symptoms whilst clinically her nose appears normal. She will be followed up regularly in the department.

Histological Examination. (Fig. 4.)

Dr. Hugh Cowdell submitted the following report:

"The specimen consisted of several portions of complex papillary structure with projecting finger-like and rounded processes. Microscopically, the processes have a core of moderately vascular connective tissue varying in density and showing mild subacute inflammatory infiltration. This is surrounded by epithelium which is nearly all of transitional type. Occasionally it is frankly squamous with a thin keratinized layer while in a few areas there is a superficial columnar

ciliated layer and graduation is visible between a broad pseudostratified columnar epithelium and the transitional pattern. Mitotic figures are easily found in the deeper layers but are not very frequent. No stromal invasion by epithelial cells or other evidence of malignancy is seen. There are differences of opinion about the ætiology of these transitional cell papillomata but their behaviour is that of a benign neoplasm with a tendency to local recurrence."

Review of the Literature

The literature abounds with confusion regarding this condition. Eggston, (1947) believes it to be a chronic hyperplasia due to virus infection and describes it as a papillary sinusitis. He regards it as analogous to the multiple papillomata of the larynx and possibly of the urinary tract which are usually regarded as benign neoplasms. However, if the virus theory of neoplasia is ultimately proved correct, then these conditions may all initially be hyperplasias but it is evident that finally they develop neoplastic properties.

Ringertz (1938) agrees that the condition is a benign tumour of epithelial origin and terms it an inverted papilloma to describe the feature of cell multiplication occurring in the deepest epithelial layers resulting in infolding of the epithelium and compression of the connective tissue stroma. Ormerod (1952) and Lucas (1951) feel that the term papilloma should be abandoned altogether for the condition.

Osborn (1956) in a review of the literature, adds a further 61 cases occurring in the nasal cavity, antra and ethmoid sinuses. He refers to these tumours as benign transitional cell growths which have the following characteristics:

(1) A mixed histological picture with interspersed areas of transitional cell, squamous and ciliated columnar epithelium.
(2) A higher recurrence rate following removal.
(3) Some appear to have a multi-centric origin.
(4) A small percentage undergo malignant change.

The site of origin of this tumour is usually the nasal cavity or the ethmoid or maxillary sinuses. Herxheimer (1912) has described a case involving the frontal sinuses and Lehman (1949) has recently reported a case of papillary sinusitis which ultimately spread from the ethmoids to the frontal sinuses and finally resulted in a frontal sinus fistula. No cases appear to have been reported arising primarily in the frontal or sphenoidal sinuses.

Comment

It is generally agreed that this condition is a benign tumour of epithelial origin and histology. Also it behaves in exactly the same way as do papillomata elsewhere. Therefore, it would seem that papilloma is the correct pathological term and transitional cell may be added to give an indication of the predominant histology.

Soft, non-tender, fluctuant swellings arising from the floor of a frontal sinus are usually diagnosed as mucoceles and the surgical approach planned accordingly. X-rays do not help greatly in elucidating the diagnosis except to show enlargement of the affected sinus and perhaps erosion of the floor. Hence

occasionally unexpected pathology is encountered and cases of primary cholesteatoma of the frontal bone, carcinoma and sarcoma of the frontal sinus have been reported which were clinically thought to be mucoceles. When this occurs, the exposure provided by the osteoplastic frontal approach gives excellent access to both frontal sinuses and ethmoidal labyrinths and widespread pathology can be eradicated. It is suggested that the osteoplastic frontal approach should be used whenever there is any doubt as to the nature of the pathology in this region.

This case also exemplifies the chronicity of nasal papillomatosis, for the patient was known to have possessed an infra-orbital swelling for at least 8 years. It is difficult to decide whether the origin of the condition was multi-centric for the whole of the mucosa of both frontal sinuses appeared to be involved. Certainly it was widespread. The chances of malignant change in this case seem remote as the patient is now aged 74 years. But regular observation will be necessary in case either this or a recurrence should occur. Kramer and Som (1935) recommend that recurrence may be best prevented by using a combination of radical extirpation followed by radiotherapy. Although nasal and sinus papillomata are poorly radiosensitive, this may be the treatment of choice in younger subjects.

In the case of the patient recorded above the advice of Dr. Frank Ellis, Director of the Department of Radiotherapy, was sought and he thought that irradiation should be reserved for possible recurrence.

Summary

(1) A case of transitional cell papillomatosis arising primarily in the frontal sinus is described.

(2) The osteoplastic flap approach to the frontal sinus is recommended for tumours of doubtful pathology in this region.

Acknowledgements

I wish to thank Mr. Ronald Macbeth and Mr. Colin Johnston for their permission to publish this case. My thanks are also due to Dr. Hugh Cowdell of the Pathology Department, and the staff of the Photographic Department at this hospital.

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NON-CHROMAFFIN PARAGANGLIOMA OF THE MIDDLE EAR—THE GLOMUS JUGULAR TUMOUR

By NALIN R. MERCHANT (Bombay)

Introduction

THE nature of the vascular tumours of the middle ear has been suspected right from 1906 when Beck reported a case of angioendothelioma of the middle ear. But the credit for first accurately diagnosing this primary vascular tumour which had arisen in the hypotympanum, goes to Rosenwasser in 1945, who identified it with the glomus jugularis of Guild after Stacy Guild had described this tiny structure in the adventitia of jugular bulb in 1941. Since then, a host of other workers have reported the tumour under such varied names as non-chromaffin paraganglioma, tympanic body tumour, receptoma, chemodectoma and glomerocytoma; though some of the names imply a function which is not yet proved. It is felt that the term nonchromaffin paraganglioma should have been favoured as:

(*a*) the cells fail to stain with chromium salts

(*b*) Jugular body is in the same category as Carotid body which is classified as non-chromaffin and non-adrenalin producing, yet paraganglionic. And Guild assumes the function of glomus jugular and carotid body to be similar.

Clinical Record

H.I., a female aged 35 was admitted to Haji Bachooali Hospital, Parel, Bombay on *March 12th, 1960* for:

(1) Long standing left purulent otorrhœa
(2) Increasing deafness on the left side over the past one year
(3) Left sided facial palsy of four months' duration
(4) Tinnitus which did not bother her and
(5) Pain over the left temple at times.

Examination revealed a moderately built and nourished lady with no abnormal findings in nose and throat. The left external auditory meatus was filled and occluded by a smooth polyp-like, reddish grey mass which was partly movable. There was a collection of mucopus in the canal and nothing beyond could be seen. No bleeding whatsoever, occurred at the time of examination. The antrum was tender, Rinne's test negative and Weber's lateralized to the same side. She also had a left-sided facial paralysis, of the infranuclear type. Audiogram revealed a loss of 70 db in the conversation range by air and of 40 db by bone. A caloric test could not be carried out obviously because of the polyp filling up the external canal and on a Radiogram no significant changes were seen on the left side except for some increase in density. She was labelled up as a

case of chronic mastoiditis and it was decided to operate to relieve her of the facial situation and a suitable tympanoplasty.

Operative Technique

Since the skin over the back of the pinna was to be grafted, the classical post-aural approach was preferred. Bone round the cribriform area over the antrum was soft and hæmorrhagic and there was an absence of any clear demarcation from the adjacent bone. Even the bone away from the antrum showed an increased vascularity and although it was felt that the bleeding was rather more than usual, the nature of the lesion was not suspected until the antrum was opened up. A very free bleeding issued on trying to clear the antrum of its contents. This raised a strong suspicion of the lesion being a glomus jugular tumour and once this possibility was realized the usual practice of clearing away the antrum was deferred. Instead we now proceeded to "remove the patient from the tumour rather than the tumour from the patient" in the manner described by Weille (1951). A deliberate trauma to the tumour was now carefully avoided and at the same time it was being exposed by removal of the bone from around it. This reduced the bleeding to a considerable extent. The entire mass was found to be filling the antrum, the epi-, meso- and hypotympanum and had extended into the ext. auditory meatus. The tumour had invaded the horizontal part of the fallopian canal at its bend but no erosion of the bony canal was seen in the vertical part of the seventh nerve. All the three ossicles were missing or at least could not be located amongst the main mass of the tumour tissue. The footplate also was not identified in spite of working with 6× magnification. Once the bone from the outer margin of the tumour tissue was completely removed, it remained only to be separated from its bony bed (i.e. bone lying deep to the tumour). This was accomplished by means of a fine periosteal elevator. The process was not quite easy—a constant difficulty being bleeding from the mass. However, on freeing it adequately on all sides, a rapid dissection was attempted to remove it *en bloc*. This was accompanied by a very violent bleeding from the large nutritive vascular attachment of the tumour in the hypotympanum and although most of the tumour could be removed, some amount of the neoplastic tissue remained in the floor of the hypotympanum where the tumour appeared to arise. Any attempt to tease out or excise this residual tumour tissue in the floor was accompanied by a violent bleeding filling up the entire mastoid cavity. So profuse was the hæmorrhage that a big suction canula of a type used in tonsil surgery was inadequate to maintain a fairly visible field for further work. The bleeding however could be controlled by pressure pack of a roller gauze over gelfoam and held in place for several minutes. Three times an attempt was made to rid the hypotympanum of this residual neoplasm and each time the profuse bleeding defied the same. Therefore it did not seem wise to persist with the efforts and that small amount of neoplastic tissue in the floor was left alone. No cautery was used. Eustachian orifice was found free of the tumour and except for the part in the hypotympanum it was felt that the tumour was completely excised. Radical mastoid operation was completed with the necessary toilet.

The histological report on the material sent read "Section shows structure of

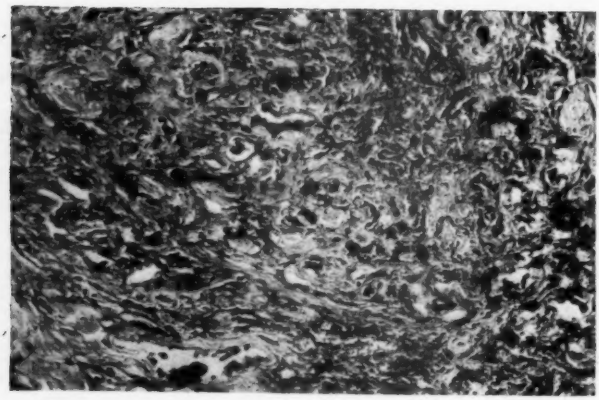

FIG. 1.
Typical histological appearance showing a rich network of capillaries lined by epitheloid cells. 325× approx.

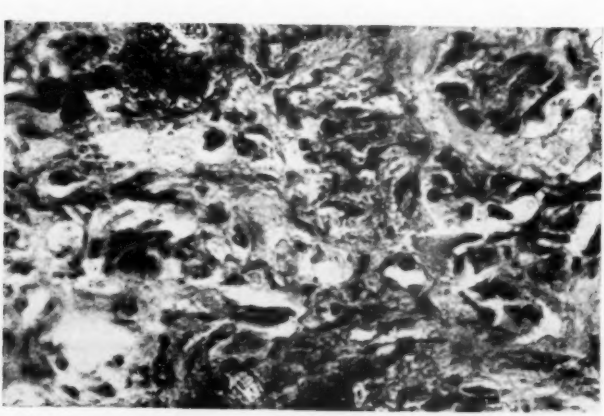

FIG. 2.
A portion of the field from Figure 1 with 1460× approx.

a glomus tumour with secondary infection and formation of granulation tissue".

Post-operative course was uneventful and the cavity has been dry at the end of a month. But a constant worry is that tiny bit of tumour tissue left in the hypotympanum.

Discussion

Missed Diagnosis

Absence of any bleeding—spontaneous or otherwise, a lack of pulsating tinnitus and noninvolvement of 9th, 10th or 11th cranial nerve were mainly responsible for a wrong pre-operative diagnosis. On the other hand, a long standing aural discharge lately complicated by a facial palsy, a presenting polyp in the external ear which did not bleed at the time of examination, a relatively good bone conduction and sclerosis on a mastoid film accorded a ready diagnosis of infective mastoiditis. Impaired hearing would occur in both and pain should be less common in cases of glomus jugulare tumour. I do not know if Brown's (1953) pulsation sign would have been of a definite value in arriving at a correct preoperative diagnosis in view of these confusing facts. Nor is radiography of any help in differentiating it from other lesions.

Origin

The tumour is said to begin wherever glomus tissue occurs i.e. the dome of the jugular bulb, in the canal that transmits Jacobson's nerve, in the hypotympanum or even on the promontory. In the case cited there is reason to believe that the tumour had arisen in the hypotympanum. It was here that the bleeding was most violent. Again, because of the extension upwards in the middle ear and antrum the nerves of the jugular foramen have escaped.

Hæmorrhage

The problem of bleeding should not worry an otologic surgeon as in days gone by. Bleeding can effectively be controlled by firm pressure with gelfoam and gauze pack held in place for 3–4 minutes. Electrocautery and transfusions would also relieve much of the surgeon's anxiety. Again, preliminary ligation of the external carotid below the origin of ascending pharyngeal artery, although advocated for large pulsating tumours, is of doubtful value, it probably makes no appreciable difference in minimizing the loss of blood. In the reported case none of the last three methods were called upon and all bleeding could be checked with only gelfoam and gauze pack.

Loss of Anatomy

As the tumour advances it destroys the anatomical landmarks and this taxes all the surgeon's skill, particularly when the tumour has eroded the facial canal, cochlea, petrous apex to expose the internal carotid or the dura of the mid and posterior fossa. Fortunately enough we did not have much difficulty as only the facial canal was involved.

Metastasis

Although Winship (1948) has reported cervical lymph node metastasis and Lattes (1949) found one liver metastasis, this patient did not show any clinical evidence of the same.

Radiosensitivity

Glomus tumours elsewhere are radioresistant generally (Shambaugh, 1959). Also as Weille, 1951 has quoted his radiologist '. . . . . and there is no reason to presume that those in this location should be more responsive. . . . . Treatment is not without hazard to normal tissue in which the tumour lies and I would not recommend this procedure." The otologist then, in his blessed duty of helping his patients with all the care and guidance has only one course left to him and that is Surgery. And yet, despite the changes brought by technical advances in microsurgery of the temporal bone the surgeon has to realize his limitations and shortcomings in a really advanced case.

Finally, certain questions remain to be solved:

(1) *Recurrence*: Does the tumour really recur in its true sense or is it only an extension of the remnant disease, as might happen in this case?

(2) Could it be that the possibility of metastasis lies in the vicinity of jugular bulb—excision of the tumour—and dissemination therefrom?

(3) How far does the ligation of external carotid below the ascending pharyngeal minimize the bleeding?

(4) How would one better the prognosis in case of a very extensive tumour and inadequate surgery?

Acknowledgements

In conclusion, I desire to express my gratitude to my chief, Dr. Bharucka for his help and guidance and to Dr. Telung, the Superintendent, Haji Bachooali Hospital, for permission to use the hospital records. I am also indebted to Dr. Deshpande and Dr. Mrs. Sant of the Pathology Department, KEM Hospital, Bombay, for their help in reading the histopathology of the tumour.

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LIPOMA OF THE LARYNX

By J. H. GRANT

LIPOMAS are uncommon tumours of the larynx, as Birkett (1934) could find records of only forty-seven cases, including the first case described by Holt (1854). Further, Capps (1957) failed to find any lipomas in his series of benign tumours of the larynx, as did Stewart (1957) in his, of one hundred and four cases seen over a period of about twelve years.

Since the paper by Birkett (1934), additional cases have been reported by Maconie (1951), Harbert (1951), Som and Wolff (1952) and Rylin (1959). All authors agree that the extrinsic variety are less rare than the intrinsic. It is also of interest that the case, described by the last mentioned author, appears to be the only one in which the lipoma arose from the true vocal cord.

Case History

A housewife, Mrs. M. J., aged seventy-two years, was seen on *29.7.60* and gave one year's history of increasing hoarseness, a feeling of choking and a bubbling sensation in the throat which occurred more with swallowing of fluids than with solids.

No significant family or previous history was obtained.

Clinical examination showed a large smooth walled swelling to be present in the region of the left arytenoid and posterior part of the left ary-epiglottic fold.

Both vocal cords appeared normal and moved well and equally.

Cervical adenitis was absent.

The only other finding of interest was a congenital malformation of the right pinna.

Special Investigations

2.8.60. W. R. Negative.

2.8.60. X-ray of the chest showed no evidence of active lung disease. There was a generalized cardiac enlargement with atheromatous calcification in aortic arch.

A lateral x-ray of the neck did not reveal any soft tissue abnormality, but there was generalized decalcification of the bones with degenerative changes in the cervical vertebrae.

2.8.60. Blood investigation:

Hæmoglobin estimation=86%.

Differential white cell count—

Total 3,000 per c.mm.

Polymorphonuclear leucocytes	1950/c.mm. (65%).
Lymphocytes	900/c.mm. (30%).
Monocytes	150/c.mm. (5%).

4.8.60. Histological examination of a biopsy removed at direct laryngoscopy showed only fatty tissue.

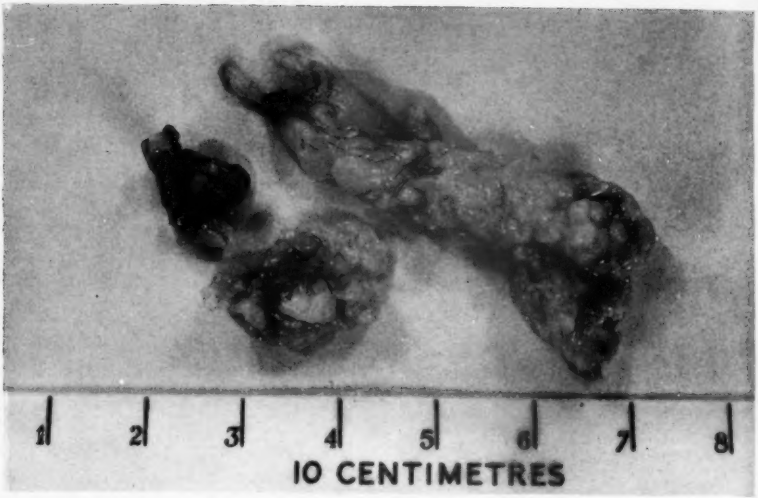

FIG. 1.
Showing tumour removed at operation.

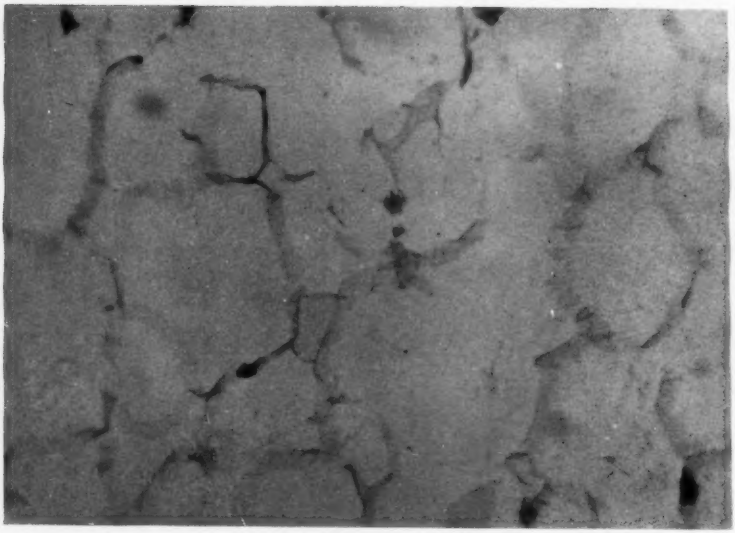

FIG. 2.
Microphotograph of tumour showing fat cells (× 450)

Operation

This was carried out by Mr. J. C. McFarland on *18.8.60*.

Under general anæsthesia and using a Lynch suspension laryngoscope, a clear view was obtained for the tumour-bearing area. Following incision of the overlying mucosa, the fatty and clinically benign tumour illustrated in Fig. 1 was enucleated.

Following operation the patient made an uninterrupted recovery.

Multiple histological sections, one of which is illustrated (Fig. 2), confirmed the diagnosis of lipoma.

Discussion

It is worthy of emphasis that the use of suspension laryngoscopy gave a clear operative field and simplified the removal of the tumour.

Multiple histological sections showed the neoplasm to be a true lipoma and failed to demonstrate any admixture of fibroblasts or other mesenchymal tissue or the incorporation of laryngeal tissues within the tumour, as have been described by Willis (1948).

The ætiology of this particular neoplasm was indeterminate, as it was solitary and the patient failed to give any family history.

Summary

A case of extrinsic laryngeal lipoma is presented and the ease with which it was removed through the Lynch's suspension laryngoscope is emphasized.

Acknowledgements

My thanks are due to Mr. J. C. McFarland for permission to publish this case and to Mr. D. L. Reeve for the photography.

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PARAPHARYNGEAL CHEMODECTOMA WITH AURAL MANIFESTATIONS

By J. A. HARPMAN (Warwick).

THE diagnostic and surgical problems presented by the case here described and discussed may prove of interest.

Case history

A lady born in *1905* was seen by me for the first time in *1948*, complaining of right-sided deafness for four years. The right ear drum was red and full; the right Eustachian tube orifice in the nasopharynx looked obliterated—? by lymphoid tissue; the left tonsil was absent and the right one was present and pus was expressible from its crypts; tuning fork tests and audiometry showed moderate right middle-ear deafness; the right Eustachian tube could not be inflated; she had dental sepsis; the mastoids and sinuses were clear on x-rays. Her tonsils had been guillotined and her adenoids removed elsewhere in *1920*, without anæsthesia; it was queried whether the right Eustachian tube obstruction might be a consequence of crude adenoidectomy.

She was examined several times until *1952*. The right ear drum remained for the most part red and full, especially postero-superiorly; occasionally it appeared less congested; it was not seen to move on examination with a Siegle speculum; right-sided tinnitus was noticed occasionally; the right-sided deafness became worse, and the right mastoid air cells became hazy on x-rays. Fullness of the right parotid region developed; nothing neoplastic could be felt in the neck in this large, plethoric, well-nourished lady.

Suggestions that the right ear be explored surgically, that myringotomy be done, that the nasopharynx be examined more thoroughly under general anæsthesia and biopsies from around the Eustachian tube opening there be taken were refused. Urging surgery resulted in her absconding.

In *1960*, she attended a dental surgeon, who, noticing that the right pharyngeal wall and tonsil were pushed grossly inwards and forwards, persuaded her to come to see me again. She stated that she had had a quinsy, treated with an antibiotic systemically, three years previously, and she thought that the swelling observed by the dentist was a consequence of this. Examination showed a right aural polyp, gross right middle-ear deafness, with also right perceptive deafness for the higher frequencies, dull right mastoid cells on x-rays, soft swelling of the right parotid gland region, gross inward displacement of the right side of the nasopharynx, oropharynx and hypopharynx and medial and forward displacement of the right tonsil and adjacent areas (Fig. 1); gentle palpation suggested that the underlying lesion was soft, but, as the subsequent findings showed, this impression was erroneous and due to the plethora of her thick pharyngeal wall. X-rays showed a large mass filling the right pterygoid region, occluding the right side of the nasopharynx (Fig. 2). The erythrocyte sedimentation rate, blood count and hæmoglobin were normal.

FIG. 1.

Photograph showing the fullness of the right parotid region and the displacement of the right pharyngeal wall by the underlying neoplasm.

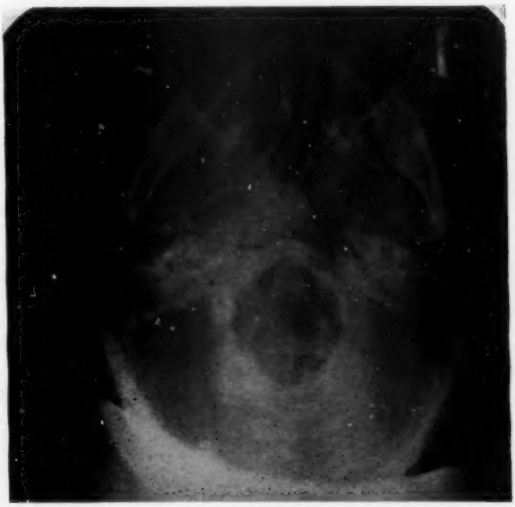

FIG. 2.

X-ray indicating the right parapharyngeal neoplasm.

She was seen in consultation with Dr. T. W. Backhouse, radiotherapist, and we agreed that at any rate the superficial part of the parotid gland was probably pushed outwards by a parapharyngeal neoplasm, that this was probably a mucous gland tumour—possibly a "dumb-bell" tumour of the parotid gland (Patey and Thackray, 1957)—and that surgical exploration, removal of the tumour if possible, its histological examination and perhaps post-operative radiotherapy were the right actions to pursue. Regarding the ear, it was thought that there might be middle-ear cleft infection secondary to Eustachian tube obstruction by the neoplasm, or that this might have invaded the middle ear and mastoid, or that it might have arisen from the middle ear; glomus jugulare tumours may extend to the nasopharynx or pharynx (Siekert, 1956; Weille and Lane, 1951).

Planning the operation: Laryngologists know that benign retropharyngeal neoplasms can be removed by blunt dissection, sometimes with remarkable ease, through an intra-oral approach (e.g. Havens and Butler, 1955). However, the nature of this tumour was unknown, and it was felt that an external approach would ensure control of the great vessels in the neck and other important structures. It was thought that combined external and intra-oral approaches might be required, and that intra-oral manipulations would be easier and safer if general anæsthesia were continued through a tracheotomy, with a cuffed tube; provisions for this to be done were therefore made. As there might be interference with the carotid circulation during the operation, arrangements for possible arterial grafting were made, and it was decided not to have hypotension during the operation, as the risk of hemiplegia when a common or internal carotid artery is occluded is greater if the blood pressure be lowered (also Martin, 1957). In *1949*, she had been treated for right leg varicose veins with thrombosis; for this reason also hypotension was not used, and her legs were elevated, moved and massaged several times during the operation. Blood was cross-matched for transfusion if required.

It was borne in mind that access to the pterygoid region and to the base of the skull about the nasopharynx can be obtained by retracting the parotid gland upwards—if necessary after division of the external carotid artery and of the stylohyoid and posterior belly of the digastric muscles (also Patey, 1960) and by resection or temporary division of part or the whole of the ascending ramus of the mandible (Harpman, 1958).

It was intended to explore the right mastoid and middle ear at the same or at a further operation.

No pathogenic bacteria were found on culture of a right aural swab, but a few colonies of beta hæmolytic streptococci, sensitive to penicillin, were grown on culture of a right tonsil swab, so a course of penicillin was administered concurrently with surgery.

The dental sepsis was dealt with by appropriate extractions pre-operatively.

THE CERVICAL OPERATION (*February 1960*). General anæsthesia was administered by Dr. R. Shaw, an oro-tracheal tube being used. A right parotidectomy type incision was made (Fig. 3). An extremely hard and adherent tumour, about the size of a small fist, weighing approximately 45 grammes, was removed in three pieces. It extended from the base of the skull to the bifurcation of the common carotid artery. It was firmly adherent to the internal jugular vein, which was

compressed by it, and to the internal and external carotid arteries; the proximal 2 inches of the latter were removed with the tumour, after ligation, with silk, both above and below this segment firmly attached to the tumour; the internal jugular vein and internal carotid artery were dissected out of the tumour up to the base of the skull and preserved. To obtain access up to the base of the skull the stylohyoid and the posterior belly of the digastric muscles were divided and the angle of the mandible was resected sub-periosteally; the lower parts of the

FIG. 3.
Photograph showing the incision used to approach the tumour.

masseter and internal pterygoid muscles and the parotid gland were retracted upwards. The tumour was so firmly attached to the base of the skull that it had to be scraped off it with a broad Lempert periosteal elevator; it was para- and retro-pharyngeal—the pharyngeal wall was not opened. It also had to be dissected off the vertebral column, the intervertebral foramina and the styloid process. The spinal accessory, hypoglossal, glossopharyngeal, vagus and cervical sympathetic nerves ran through the tumour and had to be sacrificed; the last two were bathed in and injected with procaine solution before division. Whilst the tumour appeared to have been removed completely microscopically, its dissection off vital structures was so difficult, owing to its extreme fibrous

adhesions, that it was feared that there must be microscopic remains throughout the operation area, and it was hoped that the histology would show at least slight radiosensitivity, so that post-operative radiotherapy might prevent recurrence. The operation took 7¼ hours, and my fingers were painful and sore for several days afterwards—so hard were the fibrous adhesions that had to be divided. Very little blood was lost, but one pint was administered. The platysma muscle was sutured with catgut, and the skin with subcuticular nylon and a few interrupted sutures, without drainage.

Postoperative course and complications. On the day after the cervical operation, a temporary tracheotomy was done below the isthmus of the thyroid gland, through a small, transverse incision, because of right sided laryngeal œdema which obstructed the airway somewhat, and to facilitate sucking out her tracheo-bronchial tree, as she was inhaling some saliva because of the swallowing difficulty due to dividing the right vagus nerve at the base of the skull.

She was nourished intravenously for two days, post-operatively, and thereafter, for sixteen days, through a naso-gastric Ryle's tube. Tube feeding proved difficult, as milk—whether cow's or goat's—induced vomiting, thought to be psychogenic by a physician; chlorpromazine allayed this somewhat. While the Ryle's tube was in she had several hæmatemeses and had melæna and anæmia requiring five pints of blood to bring her hæmoglobin back to normal. The alimentary tract bleeding did not respond to systemic and topical hæmostatics but ceased when the feeding tube was omitted. There has been no alimentary tract bleeding or dyspepsia since. Contrast medium x-rays to determine the possible presence of, for instance, a diaphragmatic hiatus hernia have not been done, as there has been no further dyspepsia and there is still slight, occasional, laryngeal spill-over. In *August 1960* there was still occasional choking and coughing on drinking or eating, but the swallowing disability and the laryngeal spill-over were not severe enough to warrant surgical correction. She was advised to try to swallow food and drink on the left side of her throat. By *October 1960*, the dysphagia had improved a lot.

She was deliberately undernourished, while being tube fed, to get her excessive weight down, but she very soon put it all on again on regaining control over her diet! The dysphagia would not, therefore, appear excessive. The right vocal cord is paralysed and atrophic and the voice is weak. As she is a school teacher, she may like her vocal strength increased by having nasal septal cartilage implanted under the paralysed cord to displace it medially; she is considering this. There is a right Horner's syndrome, and hemiglossal paralysis.

A pressure sore developed on the left parietal eminence from lying on the operating table so long and perhaps as a result of the force required to free the tumour at various stages of the operation; we usually place the head on the operating table on a ring covered with gamgee, in head surgery, and the gamgee may inadvertently have been omitted in this case; the sore soon healed.

Serous, lymphoid fluid was let out of the operation area in the neck a few times during the first post-operative ten days, by inserting a blunt forceps in between the sutures.

The nasopharynx, including the right Eustachian tube opening, gradually regained normal appearances.

The nature of the tumour. The tumour was hard, lobulated, fawn, grey, homogeneous and encapsulated macroscopically. Microscopically, it was reported by Dr. D. F. Barrowcliff to be a "carotid body" tumour (chemodectoma) (Figs. 4 and 5), with no evidence of malignancy. There was infiltrated nerve in the specimen.

RIGHT MASTOIDECTOMY (*April 1960*). Since *February 1960*, the right ear had been kept clean by mopping and filling with 60% spirit daily. There had been a

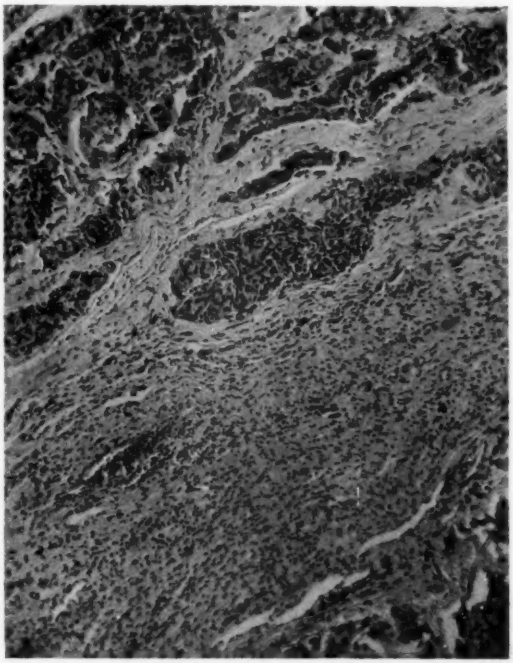

FIG. 4.
Photomicrograph of the chemodectoma.

little intermittent purulent discharge from the ear, and a postero-inferior polyp was still evident. It is known that chemodectomas may be multiple (Dallachy and Simpson, 1960; others quoted by them; Zacks, 1958). It was queried whether there might be a chemodectoma in the right middle ear and mastoid. No biopsy of the polyp was taken because of the severe hæmorrhage that sometimes occurs if the polyp be a chemodectoma.

The right middle ear and mastoid were explored (anæsthetist: Dr. L. A. Davis) through an incision that commenced near the ear drum superiorly, was carried outwards down to bone along the roof of the external auditory canal, carried into the antauricular triangle and then extended upwards, backwards and downwards (Fig. 6). This approach combined the advantages of the endaural

and the postaural exposures for an extremely cellular mastoid, while preserving a good blood supply to the outer ear and adjacent soft tissues. Gross chronic infection of the mastoid and middle ear was cleared out; the malleus and incus were necrotic and were removed; the mucosa of the middle ear was toughly adherent to under-lying bone, granular in appearance and studded with small abscesses—it was removed except for some granulations which were left in the oval window; the stapes was mobile; the remains of the ear drum looked like infected granulations and were removed; mucous membrane in the Eustachian

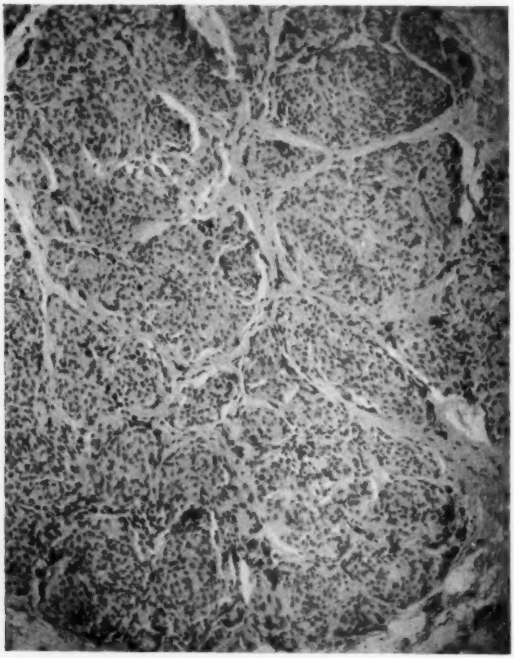

FIG. 5.
Photomicrograph of the chemodectoma.

tube ostium was preserved. The extensive mastoid and hypotympanic cell systems were exenterated. A polythene tube slid easily down the Eustachian tube into the nasopharynx. The lower part of the middle ear was packed with gelatin sponge and a Rambo (1960) musculoplasty carried out. Two pints of blood were administered during and after the operation. Beta hæmolytic streptococci were found in the mastoid and middle ear. Fig. 6 shows the healed result. Audiometry in *October 1960* showed that the hearing loss, for air conduction, in the right ear, was 70 decibels, as against 90 decibels pre-operatively, for the frequencies up to 4096 decibels, above which she still heard

nothing in the right ear. It is likely that the stapes will become fixed by fibrosis. If she should so desire, further exploration and tympanoplasty or labyrinthine fenestration could be done later to improve the hearing further—but at present the other ear is all right and she is not keen on further surgery.

Comment

Some points not already considered will now be discussed.

The origin of the tumour. Dallachy and Simpson (1960) have reviewed the

FIG. 6.

Photograph showing the mastoidectomy approach and the healed result. The superior and posterior parts of the incision are just within the hairline.

literature on chemoreceptor tumours in the neck. In the light of their study it is very likely that the chemodectoma in the patient here described arose from the inferior or nodose ganglion of the vagus nerve.

Differential diagnosis. Dallachy and Simpson (1960) remark that none of the tumours reported as arising in the ganglion nodosum, or outwith that structure and the carotid body, was diagnosed correctly before operation.

The neoplasm in the case here discussed resembled clinically, and at operation, the parapharyngeal neurilemmomata described by Slaughter and de

Peyster (1949), Guggenheim (1953), Gore *et al.* (1956) and others quoted by them. They arise most commonly from the vagus and cervical sympathetic nerves. Neurilemmomata may or may not paralyse the nerve from which they arise; paralysis occurs especially if the nerve be in a bony canal.

The surrounding fibrosis. I had thought that the extreme fibrous adherence of the tumour to surrounding structures might have been due, at any rate partly, to episodes of infection in the adjoining tonsil, but Dallachy and Simpson (1960), from their full review of the literature on these tumours, comment that "the main obstacle to removal of chemodectomas in the neck and near the base of the skull is usually the dense surrounding fibrosis which often encloses the internal carotoid artery, internal jugular vein and the ninth and eleventh cranial nerves which accompany the vagus through the jugular foramen; the vein and cranial nerves may have to be sacrificed with the tumour (King, 1955)."

The Management of the vagus nerve. I have witnessed cardiac and respiratory vagal inhibition from surgical interference with the vagus nerve in the neck or in the posterior cranial fossa. Therefore, I would not touch a vagus nerve above the heart unless the patient be adequately atropinized, and the nerve be treated with a local anæsthetic.

Section of one vagus nerve high in the neck is stated by Slaughter and de Peyster (1949), Gore *et al.* (1956) and others to produce hoarseness and dysphagia with coughing and choking attacks, these symptoms diminishing somewhat in time.

In the dog, relaxation of the cricopharyngeus sphincter is mediated by the vagus nerves, contraction by the cervical sympathetic nerve supply (Kirchner, 1958). Dysphagia after section of the vagus and cervical sympathetic nerves high in the neck is probably due mainly to the sensory and motor results of the vagus paralysis, in view of the diffuseness of sympathetic innervation.

If aspiration of saliva, and of fluid and solid nourishment should become more troublesome, it should be determined whether or not the non-paralysed vocal cord crosses the midline sufficiently for adequate glottic closure. If not, cartilage—taken, for instance, from the nasal septum—may be implanted under the paralysed cord to displace it medially, through a laryngofissure, or a transposition of the anterior end of the paralysed cord, as described by Sharp (1960), may be carried out. If the dysphagia be due mainly to failure of relaxation of the cricopharyngeus sphincter, a segment of this may be resected (Bofenkamp, 1958). This matter would require investigation by radiography with a fluid contrast medium and perhaps by pressure measurements. Barium sulphate suspension should not be used for radiological studies when there is risk of its aspiration: I know of such a case in which, after attempting to drink the barium preparation the patient had vagal stimulation with bowel evacuation and died within minutes; at autopsy much of the barium suspension was found in the lungs.

Part of the dysphagia of high cervical vagus nerve section may be due to the resulting anæsthesia of the laryngeal introitus region. Bilateral superior laryngeal nerve section results in aspiration bronchopneumonia: remedies are excision of a segment of the cricopharyngeus sphincter—the value of which procedure in such a case is not known yet, or separation of the air and food passages, by laryngectomy in a permanent case, by use of a cuffed tracheotomy

tube and a naso-œsophageal feeding tube in a temporary one. Martin (1957) states that section of one superior laryngeal nerve results in failure of glottic closure during swallowing, pooling of saliva in the corresponding pyriform sinus and trickling of saliva into the respiratory tract through the interarytenoid notch. The disability is more severe if both superior laryngeal nerves are paralysed, but tends to become less troublesome in time. In severe cases, to prevent fatal pulmonary sepsis, he advises laryngectomy.

Post-operative radiotherapy. Chemodectomas, whether in the neck or middle ear, are in the main insensitive to radiotherapy, but may be reduced in size or controlled for some time by it. (Dill, 1959; Lattes, 1950; Stewart *et al.*, 1956; Graf, 1953; Winship *et al.*, 1952; Williams, 1957; Figi and Weisman, 1954; Williams *et al.*, 1955). Dr. T. W. Backhouse, radiotherapist, would rather not give this lady prophylactic—i.e. with a view to preventing recurrence of the neoplasm—radiotherapy for the present because doing so might increase the dysphagia. As these tumours usually grow slowly, many years may have to pass before one may have a reasonable hope of non-recurrence. (It may be mentioned here that I have seen a very fast growing chemodectoma in a 3 year old child, who died within a few months of the first symptom—aural discharge and pain—from intracranial invasion by the tumour.)

The middle-ear cleft infection. This may have been due to Eustachian tube obstruction by the tumour, and to the infected tonsil. If the latter should give further trouble, it should be removed.

Summary

In this paper there is described and discussed a case of parapharyngeal chemodectoma—probably arising from the nodose ganglion of the vagus nerve—with middle-ear cleft infection probably secondary to Eustachian tube obstruction by the tumour.

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CLINICAL NOTE

A CASE OF NASAL PAIN

By FRANCE ROHAN (Manchester).

FACIAL pain is usually felt in the malar or frontal region and is commonly caused by sinus or dental disease. Nasal pain as such is much rarer, however, and was in fact the presenting symptom, and most interesting feature of the case reported here.

Clinical Report

A lady E.A., aged 58, first attended the out-patient department on *July 15th, 1959* complaining of headaches and pain in the nose on coughing. This seemed to involve the right nostril more than the left and was referred to a point just deep to the nasal vestibule in the anterior nares.

The condition had been present for some 5 months and had remained more or less the same with occasional exacerbations, particularly on coughing. All the patient's teeth had been extracted some 30 years before.

On examination she appeared to be an intelligent, well-nourished woman. No abnormality was noted in the upper respiratory tract apart from a mild deflection of the nasal septum to the right.

It was decided to carry out a radiological examination of the paranasal sinuses. The report, dated *21.7.59.* was as follows:

"The paranasal sinuses appear clear, but there are malposed unerupted teeth in the maxilla on both sides and there appear to be similar abnormalities centrally in the mandible. ? advisability of further investigation." Fig. 1.

As the patient was anxious to obtain relief, in spite of the negative radiological report, bilateral antral irrigation was performed on *August 6th, 1959.* The washings were clear on both sides, and a sinus infection was, therefore, completely excluded.

It was indeed difficult to explain the nasal pain in terms other than dental, and so, at the patient's next visit, stereoscopic views of the unerupted teeth were ordered in an attempt to detect any underlying pathological process. The teeth themselves appeared innocuous as shown in Fig. 2 and the report dated *12.10.59* was as follows:—

"Stereoscopic films to show the unerupted upper canines are enclosed."

No option remained at this stage but to explore the upper jaw and extract the offending canine, namely the right, as the patient's symptoms were predominantly right-sided. This was done on *4.12.59*, and the operation note was as follows:

"Palpation of the upper alveolus on the right side revealed a small pit in the buccal mucosa in the region of the unerupted tooth. An incision, raising a buccal

FIG. 1.
Antero-posterior view of unerupted upper canines and maxillary sinuses.

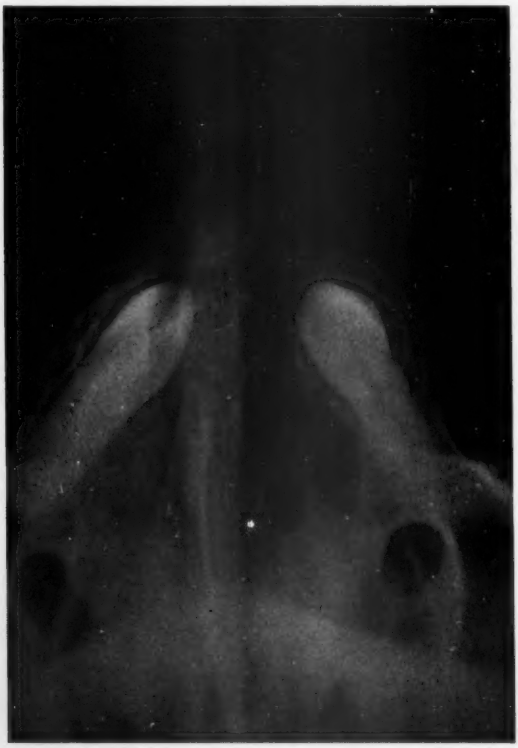

FIG. 2.
Stereoscopic views of unerupted upper canines.

and palatal flap, showed normal bone. At the first stroke of the gouge, however, the enamel of the canine was exposed. This seemed quite normal. Very little further bone work remained to extract the right upper canine. The bone chips were replaced in the cavity and the gum sutured with linen thread. Whitehead's varnish was then applied to the wound."

The post-operative course was quite unevenful, the patient being instructed

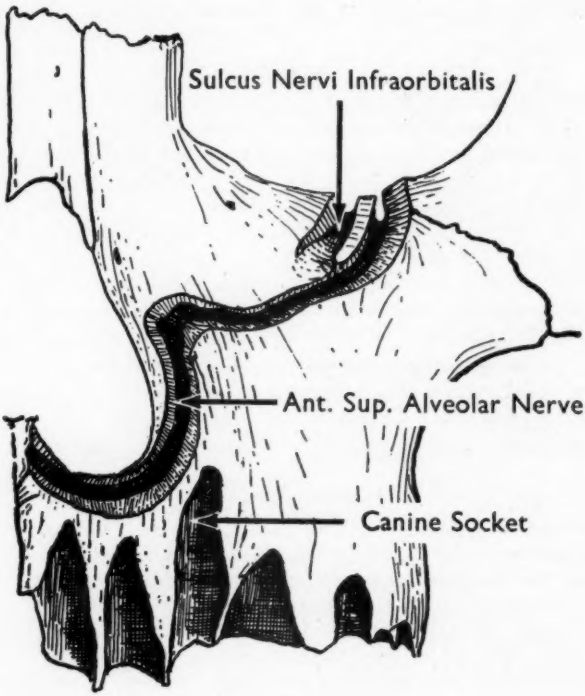

FIG. 3.

Dissection of maxilla showing the course of the canal for the anterior superior alveolar nerve and vessels and its relation to the normal upper canine socket. By kind permission of the publishers and Editor of the *Journal of Anatomy*.

to wear her dentures. Procaine penicillin was given by injection at the rate of 600,000 units daily for 5 days after the operation and the wound healed by first intention, sutures being removed on *11.12.59*.

The patient was discharged on the same day, and when seen again on *23.12.59* she said that she was now free from pain on the right side, but still felt an ache on the left.

It was decided not to proceed at once to removal of the left canine, as it was felt that the pain might subside. She was, therefore, given an appointment in two months' time.

At her next visit, however, the patient was quite definite that her pain persisted and was now only left-sided. It was, therefore, decided to admit her as soon as possible for extraction of the left upper canine.

This was performed on *29.3.60*. The operation note was as follows:—

"Left unerupted upper canine extracted. Operative findings identical with right."

The post-operative course was uneventful and the patient was discharged on *7.4.60*. Since then she has been entirely free from symptoms.

Discussion

Fig. 3 is a reproduction of one of the drawings illustrating the late Professor F. Wood Jones' article on the superior alveolar nerve and vessels (1939). In it he drew attention to the size and course of that nerve and to the contribution which it makes to the supply of the upper jaw, and particularly the upper canine.

If the pain felt by the above patient originated in her teeth, the source must have been the unerupted canines. On the other hand, it is more likely, in view of the thinness of the bony shell separating the canine from the buccal mucosa, that pressure from her dentures caused increasing atrophy of the bony alveolus and eventual pressure of the unerupted teeth against the alveolar nerve. That this appears to be the more likely explanation is perhaps corroborated by two facts:

(*a*) Extraction of the right upper canine relieved the pain on that side, but produced an exacerbation of symptoms on the left. Unequal pressure from her upper dentures must also have been a contributory factor.

(*b*) Both unerupted canines appeared healthy and normal in every way after removal.

Acknowledgements

I have much pleasure in thanking Mr. L. D. Mercer, until recently Senior Surgeon at the Manchester Ear Hospital, under whom the patient was admitted, for permission to treat her and to publish this report. I am indebted to Dr. E. L. Patterson, Senior Lecturer in Anatomy at the University of Manchester for help in tracing Professor Wood Jones' article. Professor V. F. Lambert first drew my attention to Professor Wood Jones' writings on the above subject, and I am also grateful to him for his encouragement and helpful advice. The publishers of the *Journal of Anatomy*, the Cambridge University Press have allowed me to borrow and adapt Fig. 3; for this I thank them. The illustrations were produced by the Department of Medical Illustration, and the radiographs are the work of the X-ray Department at the Royal Infirmary, Manchester.

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GENERAL NOTES

TEMPLE UNIVERSITY SCHOOL OF MEDICINE

PHILADELPHIA 40. PA.

A "Short course in Audiology" is offered several times each year by the Section of Audiology, Department of Otorhinology, Temple University School of Medicine, Philadelphia 40, Pa.

The course will be one week in length and will encompass theoretical and clinical aspects of audition. Hearing testing and interpretation will be stressed. Office procedures, equipment and Industrial Audiometry will be discussed.

Further information may be obtained by writing to Philip E. Rosenberg, Ph.D., Director, Section of Audiology, Temple University Medical Center, 3401 North Broad St., Philadelphia, Pa.

SEMON LECTURE, 1961

The University of London announce that the Semon Lecture will be delivered by Mr. C. P. Wilson at the Royal Society of Medicine on Thursday, November 2nd, 1961, at 5 p.m. The title of the lecture will be "Pharyngeal Diverticula, their Cause and Treatment".

Mr. John F. Simpson will be in the Chair.

THE MOUNT SINAI HOSPITAL

An intensive postgraduate course in Rhinoplasty, Reconstructive Surgery of the Nasal Septum and Otoplasty will be given January 13th, 1962 to January 26th, 1962 by Dr. Irving B. Goldman and staff at the Mount Sinai Hospital, New York in affiliation with Columbia University.

Candidates for the course should apply to Registrar for Postgraduate Medical Instruction, The Mount Sinai Hospital, Fifth Avenue and 100th Street, New York 29, N.Y.

UNIVERSITY OF BAGHDAD

The University of Baghdad has asked the British Council to find British candidates for a number of posts in their Colleges of Medicine at Mosul and Baghdad. One of these appointments is for a Professor of Ear, Nose and Throat Diseases at the College of Medicine, Baghdad.

Anyone interested should communicate with the Director, Recruitment Department, The British Council, 65, Davies Street, London, W.1.

General Notes

EXAMINING BOARD IN ENGLAND BY THE ROYAL COLLEGE OF PHYSICIANS OF LONDON AND THE ROYAL COLLEGE OF SURGEONS OF ENGLAND

Diploma in Laryngology and Otology

The Secretary reports to the two Royal Colleges that at the First Part of the Examination held in June, 1961, 61 Candidates presented themselves, of whom 32 passed; and that at the Second Part of the Examination held in June, 1961, 33 Candidates presented themselves, of whom 22 passed.

The following 19 Candidates, having complied with the regulations of the Board, are eligible to receive the Diploma, viz.:

Ahmadizadeh, Seyed Majid	2 Azimi Street, Teheran, Iran.
Al-Nawab, Dhia	291 Golders Green Road, N.W.11.
*Anklesaria, Darius Manek	c/o Wilson, 22 Gilmore Place, Edinburgh 3.
*Araj, Jabra Saba	Beit Jala, H.K. Jordan.
Evans, John Noel Gleave	2 Kingswood Road, Shortlands, near Bromley, Kent.
Gathercole, Raymond	c/o Military Hospital, Colchester, Essex.
Ghanekar, Dinkar Govind	Nuffield Hostel, Royal College of Surgeons, Lincoln's Inn Fields, W.C.2.
Jafferey, Asaf Husain	Hackney Hospital, E.9.
Kerawalla, Sam Dinshawji	17 Crawford Road, S.E.5.
Mahindrakar, Naganath Hanamanthrao	Royal Infirmary, Bolton, Lancs.
Maung, Thein	Croydon General Hospital, Croydon, Surrey.
Murugendrappa, Togaleri Revappa	c/o M. S. Nanjappa, 1890 Wesley Road, Tilak Nagar Mysore, India.
Noel, Joseph Gerard Maxime	159 Cromwellsfort Road, Crumlin Cross, Dublin 12.
Penn, Alan Laurence	167 Adelaide Road, N.W.3.
Roy, Nripendra Nath	Royal Berkshire Hospital, Reading, Berks.
Shankara, Mahanta Devaru	2884 Behind the Law Courts, Mysore, India.
Sil, Kamalesh Chandra	Royal National Throat, Nose and Ear Hospital, Golden Square, W.1.
Singh, Sukh Dev	c/o Royal National Throat, Nose and Ear Hospital, Gray's Inn Road, W.C.1.
Tembe, Dinkar Parashuram	24 Augustus Road, Edgbaston, Birmingham, 15.

* Examination passed previously.

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